RAILROAD GAZETTE

FRIDAY, JUNE 2, 1893.

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Contributions.

Laying Out Freight Yards.

See pp. 427 & 475

TO THE EDITOR OF THE RAILROAD GAZETTE:

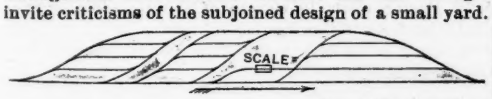
I have not the necessary data at hand to form an estimate, but I am of the opinion that there must be at least several thousand railroad yards in the United States.

Your esteemed correspondent H. D. W., in the issue of the *Railroad Gazette*, of May 12, makes the rather broad assertion that almost all of the yards in America are badly designed. Is this not a sad commentary on the ability of the men who designed these numerous yards? Accepting this statement as correct, there has apparently been no advancement or progress whatsoever in this important detail of railroad construction. H. D. W.'s article abounds in glittering generalities, and where there are so many bad designs there must be some prominent inherent radical defects. What are these and can they not be pointed out?

A yard is nothing more than a collection of side tracks, and in arranging them there certainly must be only one best way. This assertion may be controverted; but each particular yard requires special treatment. It can hardly be asserted that each of the several thousand yards should be radically different from each other. I grant that each may possess an individuality of its own; but if they are all badly designed, what is the governing fault? I am not now speaking of the comparatively few very large yards, but rather of the large number of moderate sized yards.

According to Mr. Morrison's views, which he promulgates in your issue of April 7, 1893, the civil engineer is to blame for the state of affairs, for the very peculiar reason that it is impossible for any civil engineer to have practical knowledge of all branches of railroading. As many yards are built at the same time the railroad which they intend to serve is building, the different people from whom Mr. Morrison would glean valuable knowledge and information are not at hand to consult and it might be a good idea to have a sort of roving commission appointed, composed of brakemen, conductors, yardmasters and such like, who would travel about the country and thus form a kind of an advisory board to act in consultation with the Chief Engineer in laying out prospective yards; the inference being that as these people are the ones who use the completed yards, they are the most competent to design them.

If agreeable to you I would be glad to have competent authorities present for publication, plans of ideal yards of varying capacity, say, for a daily movement respectively of 200, 500 and 1,000 cars, arriving and departing trains to be composed of say 20 loaded cars. Assuming a case where the junction of two railroads is at a summit. Would it be better to have the yards for both roads all on one side of the summit, or have it so arranged as to have separate yards, one on each side, with the summit between them? Judging from the correspondence on the subject we have much to learn yet and any information received which would remedy the existing evil should be gladly welcomed. I am now speaking of the design of the yard, that is, the proper arrangement of the tracks. To start the ball rolling I invite criticisms of the subjoined design of a small yard.



CIVIL ENGINEER.

High Speed Electric Traction.

LONDON, May 12, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I fully appreciate and value your criticisms of my paper—as published in the *Railroad Gazette* of April 21, pages 294, 303—but ask for permission to make in your columns a few explanatory remarks which may not indeed be at all out of place in other respects, owing to brings me to one other point of your criticism, which I think is well made. It deserves, at any rate, extensive discussion. I refer to the presumed advantage of spreading the adhesion weight over the train by this method of putting the motors on the cars.

So far as steadiness of running is concerned, I should feel inclined to say that the application of tractive power equally throughout the train would be more conducive to easy travel than placing it all at the front the general interest now being taken in this important subject. I would ask your readers, in the first place, to bear in mind that the paper was written more especially to put the A B C of the subject before an audience quite unfamiliar with electrical problems; and much explanation was therefore needed to show why this plan or that method has become usual.

In dealing with the entire question I made at least two assumptions, in order not to unduly increase the field of my paper; and these assumptions I was quite prepared to admit were by no means axiomatic. The first was that the practical limits of speed in steam locomotives had been reached by our modern types of engine; and the second was that the traveling public desire still greater speeds than those now usual, that railway managers must be prepared very soon, if not at once, to run their express traffic at speeds double or three times the rate of ordinary, 50 miles an hour, passenger trains.

The latter point is hardly one for the engineer to argue or discuss; it concerns the traffic manager principally, and all that the locomotive superintendent has to do is to provide engines that will carry on the work of the line in the way that suits passengers and proprietors. It is this question that is involved in the first point raised, Are the engines of to-day, or the immediate future, capable of running trains at 100 or 150 miles an hour with economy and safety under present conditions? The answer to this depends of course on many things, e. g., the character of the line profile influencing the type of engine required, for every engineer knows that a single driver runs far more easily and speedily than a coupled engine, although the latter are essential for grades with heavy trains. Given a single driving engine of good design, a level road, and a light load, there seems no reason why speeds of 100 or 120 miles an hour should not be obtained with steam locomotives.

But what I wished to emphasize in my paper was the comparison between the great dead weight of engine and tender in such a case—proportionally to the train—and the small amount necessary to an electric train. Of course, whenever high speeds are desired on any system—say, increased in the proportion of 2 to 1—the power available on the driving axles must be increased in a considerably greater ratio in order to maintain the velocity; and this law applies to all traction, whether the motive power be steam or electricity. But what I would argue is that the necessary increase of power for higher speeds is not so great in the latter case as the former, owing to several reasons. The chief one is, perhaps, that just pointed out, viz., the enormous amount of dead weight which must be carried in the shape of engine and tender when steam traction is employed, and the higher the speeds the more rapidly does this dead weight increase. At a speed of 100 miles an hour, the least weight that could represent an engine powerful enough to draw, say, a load of 100 tons, would be perhaps an equal amount; so that the dead load of motive power is at least one-half the total train weight. This is not the case with electric trains, where the weight of motors, etc.—whether mounted on the car axles or a separate locomotive—is no more than sufficient to secure adhesion; and certainly would not amount to more than, say, one-sixth part of the gross train weight, as shown in my paper with respect to the Liverpool Elevated Railway.

Another reason which helps to increase in almost geometric progression the power needed for higher speeds on steam lines may be cited in the apparent difficulty of designing suitable valve motions to admit and clear away the steam. The reciprocations appear in many cases to be so rapid that the steam hardly has time to exert its full impulse upon the piston before exhaust begins. This again involves the reason already given, because greater boiler pressures become necessary also, and both these causes lead to greater size and weight of engine.

With electric motors there is an entire absence of reciprocation, and the current, in passing through a motor designed to run at high speeds, is not necessarily choked in any way by great axle velocity.

I have sometimes wondered why—in order to get rid of the bad effects of reciprocation—the steam turbine has not been experimented upon more fully in the direction of railway work. I know it has the character of being a "steam eater," but a reciprocating engine of high speed type could hardly be called economical as regards fuel consumption. As to the actual figures of reciprocation, it is interesting to note that with an 8-ft. driver, 2-ft. stroke, the piston—at 120 miles an hour—will stop and start 14 times in a second. To be able to do this speaks volumes—nay, whole libraries—for the skill of mechanical engineering to-day.

Probably no electrical engineer will try—anyway at first—to build an electric locomotive to operate trunk line trains at high speeds; it is the very idea of doing away altogether with the locomotive that charms the man who has to build and equip an electric road. That end. At the same time it is quite conceivable that owing to a possible breakdown of the motors in front, the train would be pushed instead of pulled; and we all know the danger of that. Electrical engineers say in reply that motors ought not to break down, and they can be built nowadays so as not to break down; while of course the suppositious, specially designed, brand new line, built for high speed electric traction might avoid, to a great extent, the danger of pushing a train round curves by doing away with the curves altogether, or at any rate easing them considerably.

Speaking generally upon the subject, I would not, in conclusion, wish in any way to minimize the possibilities of steam traction; it has proved itself too good a servant to be lightly discarded on short notice. This feeling, however, does not blind me to the obvious advantages to be derived from the use of electric motors, at any rate in certain special directions; and it is such use of them that I look forward to seeing in existence on our railways.

FRANK B. LEA.

LONDON, May 15, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I note from your editorial article on High Speed Electric Traction that the question of the relative merits of steam and electricity for express service is again on the tapis. Your remarks have special reference to an interesting paper written by Mr. Frank B. Lea. I am in accord with you that the ultimate speed of steam locomotives has not yet been reached; but the present limits cannot be much exceeded without important changes in rolling stock, permanent way, and general method of working. I would not be so rash as to say that anything is impossible in engineering. As soon as it is commercially profitable to run trains at 100 miles an hour (or even faster) the problem will be seriously attacked by a host of inventors, and a solution is a foregone conclusion—although it is not possible just now to say whether steam or electricity will be the motive agent.

The question has been very ably examined by some of the most experienced electric railroad men in America, and they have had the assistance of leading steam locomotive engineers. They are unanimous in demanding better laid tracks, stiffer rails, easier grades, larger curves and separate lines for the high speed service, while an improved system of automatic block signaling is generally regarded as absolutely essential. So far the problem lies on safe ground, and is merely a question whether the traffic is sufficient to give paying loads.

But the experts join issue as to the relative advantages of steam and electricity. The electrician logically points out that the weight of an ordinary express locomotive and tender is excessive compared with that of its train of coaches, and that this must become more marked as the speed is raised, for to accomplish this the number of coaches must be diminished. That this difficulty can be combatted by more powerful engines, double or single compounded, higher steam pressures, larger boiler power, larger driving wheels and heavier metals, there seems little doubt, but will it pay? The electrician says the high speed rotary motor can be built around the rolling axles either of locomotive or of coaches; that thus less dead weight is required in any pair of drivers; that the continuous and even torque on the armature is better adapted to high speed than the reciprocating motion of parts of the steam engine; and that since each coach can be fitted (if desired) with independent motors each forms a self-contained unit, and through coaches can proceed to their destination without the aid of locomotives.

It is not certain that a train of coupled coaches, each propelled by its own motor, would be satisfactory; indeed there is a strong probability that the centre coaches would tend to derail. Therefore it is likely that any new scheme will provide for locomotives on the high speed trunk line; and that motor coaches will play an important part in local lines where a frequent service with light trains starting quickly and with large brake power are the desideratum.

The methods for collecting the currents are well thought out and only require experience to modify a few details. The erection of the service mains and feeders has been discussed in the light of actual practice and no insurmountable difficulty is feared. The enormous improvements in the construction of dynamos and motors is one of the marked features of the past year, and by means of alternating currents it appears to be possible to still further simplify the designs. Indeed, although it is time, as the steam engineer cogently remarks, a 1,000-H. P. electric locomotive has not yet been built; this is not because it is impossible, but simply because there is no demand for it. Let such a motor be required and there are several companies who would build it under restrictions of time, price and guarantees of performance.

It appears to me that the present system of working trunk lines is not yet played out, and probably there will be no chance for engineers to attempt a main line service of 100 miles an hour during this century. But while the demand for this radical alteration is growing there is time and opportunity for selecting a system and perfecting details in high speed suburban and intramural traffic, either above or below ground; and I confidently look for radical changes in both steam and electric practice, but especially in the latter.

ALBION T. SNELL.

The 20-Hour Trains Between New York and Chicago.

The "Exposition Flyer" trains over the New York Central & Hudson River and the Lake Shore & Michigan Southern began regular trips last Sunday. These trains leave daily at 3 o'clock from New York and at 2 o'clock from Chicago. The train westbound is scheduled to make the run in 20 hours, and the train eastbound in 20 hours and 15 minutes. The writer of these lines took the first train out of New York last Sunday at three o'clock eastern time, arrived in Chicago at 10 o'clock central time Monday morning (or, to be precise, at 9:57 o'clock) left Chicago at 2 o'clock central time Monday afternoon, and reached New York again at 11:15 Tuesday morning (or, to be precise again, at 11:19). This first run was a brilliant success in every particular. It was made both ways without the slightest friction or mishap, and everything went as smoothly and as accurately as if those trains had always been running. East and west, on the round trip, the train reached every station ahead of time, except the Grand Central station in New York, and there it got down to Mott Haven on time, if not ahead of time, and the delay of four minutes in getting in was due to well known causes which no human being could control now, but which the company proposes to control within a year.

The running of this train is an unprecedented and brilliant performance. The distance from New York to Chicago, as nearly as we can ascertain, is 964 miles as the "flyer" runs. This is deducting two miles at Buffalo because the trains do not run into the station, but stop at Seneca street, to change engines only. They do not take on or let off passengers there. This run of 964 miles is made in 20 hours, being an average of 48.2 miles an hour in motion. The speed on the New York Central is 50.6 miles an hour, and on the Lake Shore & Michigan Southern 46.5. The train makes nine scheduled stops, namely, Albany, Utica, Syracuse, Rochester, Buffalo, Erie, Cleveland, Toledo and Elkhart. As we have explained above, the stop at Buffalo is to change engines, and not to take on or let off passengers.

The changes of engines and lengths of engine divisions are as below: Albany, 143 miles; Syracuse, 148 miles; Buffalo, 148 miles; Erie, 86 miles; Cleveland, 96, miles; Toledo, 109 miles; Elkhart, 133 miles, and Chicago; 101 miles. The dining car runs are: Going west, Albany to Syracuse, 148 miles, and Toledo to Chicago, 234 miles; going east, Elkhart to Toledo, 133 miles, Syracuse to New York, 291 miles. The composition and weight of the trains is as follows; but the weights are approximate only, inasmuch as we have been unable to get them accurately yet: One combination, baggage, buffet and library car made by Barney & Smith, Dayton, O.; this car contains also a barber shop and bathroom; two Wagner cars containing toilet-rooms, staterooms and 10 sections each; one Wagner car with 16 sections. The difference in these cars is in the absence of certain staterooms in the 16-section car. The approximate weights of these cars are 85,000 lbs. for the combination car and 105,000 lbs. each for the Wagner cars. The engines hauling the train on the New York Central are of the well known "800 class" used in the Empire State service. These engines have, as is doubtless well known, 19 × 24 in. cylinders, 58 in. boilers and 78 in. drivers. They carry 180 lbs. steam pressure and have a total heating surface of 1,818.4 sq. ft. These engines with tender weigh, in working order, about 202,000 lbs. On the New York Central end of the line, therefore, the train weighed, say, 602,000 lbs. without the dining car, and 700,000 lbs. with it. Over the Lake Shore part of the run the trains were hauled by engines of the class shown and described in this issue, recently constructed for this service. They have cylinders 17 × 24 in., 52 in. boilers and 72 in. drivers, and weigh in working order, with tender, 174,600 lbs.

The cars are fitted with the Gould vestibule and the Leonard platform and hydraulic buffer. This buffer is entirely new, having been first put in use on these cars, and is the invention of Mr. Arthur G. Leonard, Private Secretary to Mr. H. Walter Webb, 3d Vice-President of the New York Central. The vestibules cover nearly the entire width of the body of the car, lacking but about eight inches of being flush with the sides. The vestibule floor extends out to this width, and consequently the steps hang out beyond the car sides; they are arranged, therefore, to fold up against the vestibule door. This arrangement of the vestibules is remarkably attractive. They are very comfortable places of observation, having large plate-glass windows and floor space enough for camp stools. The buffer is an arrangement of hydraulic plungers equalizing across from one to the other, so that the pressure on the buffers is constant whether the cars are on a straight line or on a curve. These plungers are worked at a pressure of about 500 lbs. to the square inch, and in going up and down grades it is found that there is but little change in the pressure recorded. It slacks off 10 or 15 lbs. in going up grade, and in going down runs up to perhaps 510 or 515 lbs. The practical outcome of these buffers and vestibules is an extraordinarily stiff and easy-riding train. At the highest speeds of the "Exposition Flyer" there was very little motion indeed; there was little oscillation either up and down or sidewise, and one could write with considerable comfort on any part of the run. Doubtless a considerable part of the steadiness of the trains was due to the excellent track on the whole line. It should be added that the cars are all new, built for this service, even the dining cars, and are uncommonly simple and elegant in finish. They are all lighted with Pintsch gas and have hot water circulation heated by steam or by Baker heaters.

The speed, as will be seen, does not exceed that of the Empire State express, and no effort was made in the run out or back to break records for short distances. On the favorite racing ground where No. 999 made its record of a mile in 35 seconds, two observers recorded consecutive miles for a stretch of 25 miles. This distance was made in 21 minutes and 26 seconds, or at the rate of 70 miles an hour, and one mile was made in 43 seconds.

Of course it will be said that these first runs of the "Exposition Flyer" have been made under the most favorable circumstances; fair and dry weather and no wind. This is true; but it must also be remembered that the Empire State express has kept up its schedule now for 20 months, and that the engines have shown their capacity for keeping time and making up considerable delays through summer and winter, and it is probably true that the Lake Shore engines will be competent to do the same thing. It will be observed that they are considerably smaller than those of the New York Central. At the same time the grades are lighter and the schedule is slower; the Lake Shore has, generally, no grades over 16 ft. to the mile.

As a matter of interest in connection with this event we publish herewith a list of the principal fast runs of passenger trains during the last nine years, presenting them in two tables, one showing long distance runs and the other those for short distances. In the first table we have also made mention of the best run we can find a record of on the old broad gauge Great Western road of England. This is not the only feat of the kind that was performed previous to 1885, but it is one that is likely to be forgotten, and we therefore put it on record in this place.

Referring to Table I., the fast run on the West Shore in 1885 was made by a special train on a new road. The two English runs in 1888 are the best recorded during a month's competition of regular trains. These English trains were hauled by very light engines, but the engines on different divisions of the road varied considerably in size and power. The run of June 22, 1891, was made by the New York and Chicago limited, after it had been detained two hours in New York. The three runs in 1892 and the first two in this year were all made by the Empire State express on regular trips.

Table II. is less accurate in a number of features than Table I. In each instance, except that of July 26, 1890, the time was taken at mile posts, and the names of places from and to, shown in the table, are merely to indicate the location approximately. The last mentioned run was not made public until after the run of Aug. 27, 1891; and the latter, when published, was given out as the best record of the Philadelphia & Reading road. The last three runs in Table II. were made by the Empire State express on regular trips. It appears that all of these and, in fact, probably all in this table, except the first, were made on descending grades. The run of May 9 has lately been reported in detail in the *Railroad Gazette*. So far as we have been able to learn the record of May 11 is equally authentic.

In Table II. engines 385 and 618 are four-cylinder compounds; numbers 206, 903 and 999 are simple engines. All of the engines shown in Table I. are simple.

TABLE I.—NOTABLE FAST RUNS OF PASSENGER TRAINS FOR LONG DISTANCES, 1835-1893.

		From	To	Distance.	Inclusive. Time.	Inclusive. Speed.	Stops	In motion. Time.	In motion. Speed.	Weight.	Engines.
				Miles.	H. M.	M.p.H	No.	H. M.	M.p.H.	Lbs.	
May 11, 1848	Great Western (Eng.).	London.....	Didcot.....	53.25	0 47	68.0	.....	.....	.....	224,000	"Great Britain."
July 9, 1885.	West Shore.	East Buffalo	New York.	422.6	9 23	45.0	12	8 17	51.0	311,000	W. Shore, Class B.
July 9, 1885.	"	"	Frankfort...	201.7	4	50.4	.....	3 23	59.6	311,000	" "
August, 1888	Lon. & N.W. and Caledonian.....	London.....	Edinburgh..	400	7 52	50.9	3	7 13	55.4	348,000	.....
Aug. 31, 1888	Gt. Northern and North Eastern...	"	" ..	392.5	7 27	52.7	5	6 47	57.8	.....	.....
June 22, 1891	N.Y. Cent. & Hudson R.	New York...	Buffalo.....	439.52	8 58	49.02	5	8 34	51.31	717,000.	"800 class."
Sept. 2, 1891	R., W. & O. and N. Y. C. & H. R.	Morristown.	New York..	360.95	6 58	51.81	6	6 27	55.96	206,000 / 284,300	No. 70 and 800 class.
Sept. 14, 1891	N.Y.C.&H.R	New York..	East Buffalo	436.32	7 19.5	59.56	3	7 05¼	61.56	459,800	800 class.
Nov. 28, 1891	Penns'vania	Jersey City..	Washington	227	4 11	54.26	2	4 00	56.75	403,000	.....
Mar. 28, 1892	N.Y.C & H.R	Oneida.....	De Witt.....	21.37	0 17⅝	72.69	0	0 17⅝	72.69	530,000	800 class.
Nov. 8, 1892	"	Syracuse....	Utica.....	51.67	0 46	67.38	0	0 46	67.38		"
"	"	Chittenango.	Schenectady	116.16	1 50	63.38	0	1 50	63.38		"
May 19, 1893	"	Syracuse....	Rochester...	80.38	1 11	68.45	0	1 11	68.45		903.
"	"	"	East Buffalo	145.60	2 21	61.96	1*	2 15	64.71		903.
May 28, 1893	N.Y.C &H.R and L. S. & M. S.....	New York...	Chicago.....	964	19 57	48.2	10	.....	.....	..... †	800 class and class 17 A.

* Six minutes. † Estimated weights: On New York Central, with dining car, 672,000 lbs.; without dining car, 572,000 lbs. On Lake Shore & Michigan Southern, about 15,000 lbs. less, the engine being lighter

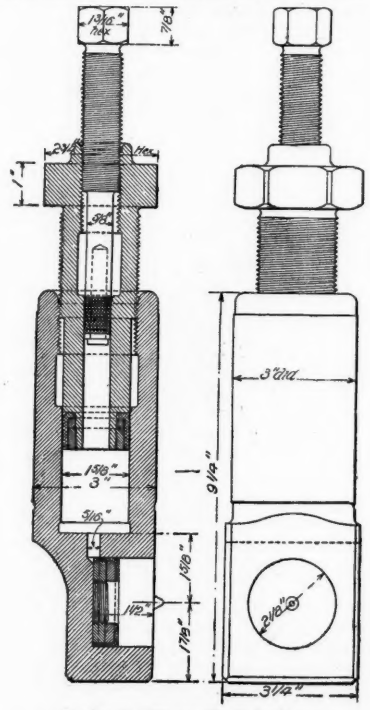
TABLE II.—FASTEST RECORDED RUNS OF LOCOMOTIVES FOR SHORT DISTANCES, 1890-1893.

Date.	Road.	From.	To.	Distance, miles.	Grade, ft. per mile descending	Time, min. sec.	Rate, m. p. h.	Load.	Engine.
January, 1890.	Northeastern (Eng.)	Newcastle.	Berwick.	.....	level.	.. ...	86	.....	Worsdell 2-cyl. comp.
July 26, 1890.	Philadelphia & Reading.	Skillmans.	Belle Mead.	4.1	.....	2:30	98.4	4 cars.	206
Aug. 27, 1891..	Philadelphia & Reading.	Somerton.	.....	1	37	0:39.8	90.5	3 cars.	206
Feb. 25, 1892..	Philadelphia & Reading.	.....	.....	.....	.....	0:39.25	91.3	4 cars.	385
May 13, 1892...	Philadelphia & Reading.	.....	.....	10	.....	.....	79.6	4 cars.	618
Nov. 18, 1892..	Philadelphia & Reading.	Somerton.	Parkland.	5	11.37&level	3:25	87.8	4 cars.	385
Nov. 18, 1892..	Central of New Jersey.	Fanw'd, N. J.	Westf'd, N.J.	1	32	0:37	97.3	4 cars.	385
May 9, 1893...	New York Central & H. R.	Grimesville.	.....	1	20 approx.	0:35	102.8	4 cars.	999
May 11, 1893...	New York Central & H. R.	Grimesville.	.....	1	20 approx.	0:32	112 5	4 cars.	999
May 19, 1893...	New York Central & H. R.	Looneyville.	Grimesville.	5	20 approx.	3:00	100	4 cars.	903

Hydraulic Piston Rod Jack.

We show in the accompanying illustration a piston rod remover or jack used in the shops of the Wisconsin Central Railroad, which is a decided improvement over the method of removing piston rods from crossheads by sledge hammers and wedge blocks.

The jack consists of a screw piston working in a chamber against a fluid in the cavity at the end of the piston, thus forcing out the short piston which bears against the end of the rod to be removed, while the back side of the jack rests against the crosshead pin. The small screw piston in the large piston furnishes a means of greatly increasing the power of the jack.



Hydraulic Piston Rod Jack.

This appliance was designed several years ago by Mr. J. W. Porter while in charge of the toolroom at the Brainard shops of the Northern Pacific. Mr. Porter is now acting in a similar capacity in the Wisconsin Central shops at Waukesha.

Railroad Matters in Spain.

The financial crisis in Spain has seriously reduced railroad traffic, so that nearly all lines are badly crippled, and some have been forced to offer new issues of bonds on the market. The only roads which have so far remained unaffected by the monetary stress are those of Asturias and San Juan de las Abadesas, and the Madrid-Zaragoza line, which latter has shown an increase since January 1 of $77,700 in its gross receipts.

Details of Passenger Locomotive, Class Y, Cleveland, Cincinnati, Chicago & St. Louis Railroad.

The class Y passenger locomotive of the Cleveland Cincinnati, Chicago & St. Louis Railroad was illustrated in the *Railroad Gazette* April 14, and the tender May 5 We now show some of the details. The engine truck is shown in fig. 1. It is 6 ft. 7 in. spread with rigid centre of cast iron. The frame is made of 4-in. by 1¾-in. bars, and the cross bars that support the centre casting are 4½ in. wide by 1 in. thick; the lower spacing bar is 5 in. wide by 1 in. thick. The frame is held square by means of two diagonal cross ties at each end of the frame extending from the upper corner of one side to the lower corner of the opposite side. These ties are 1½ in. in diameter. The equalizers are 6½ in. deep and 1¼ in. thick. The springs are 4 in. wide and have 17 plates.

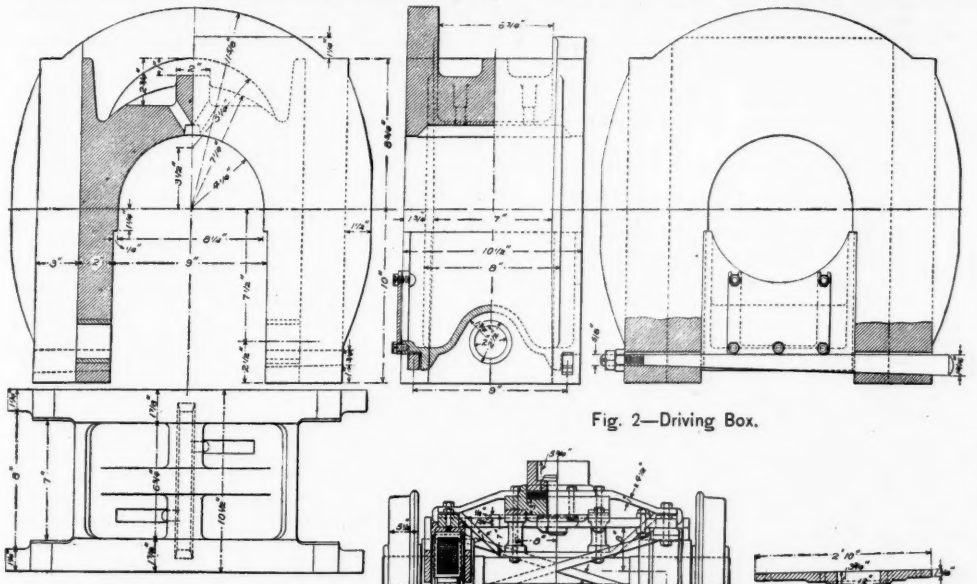
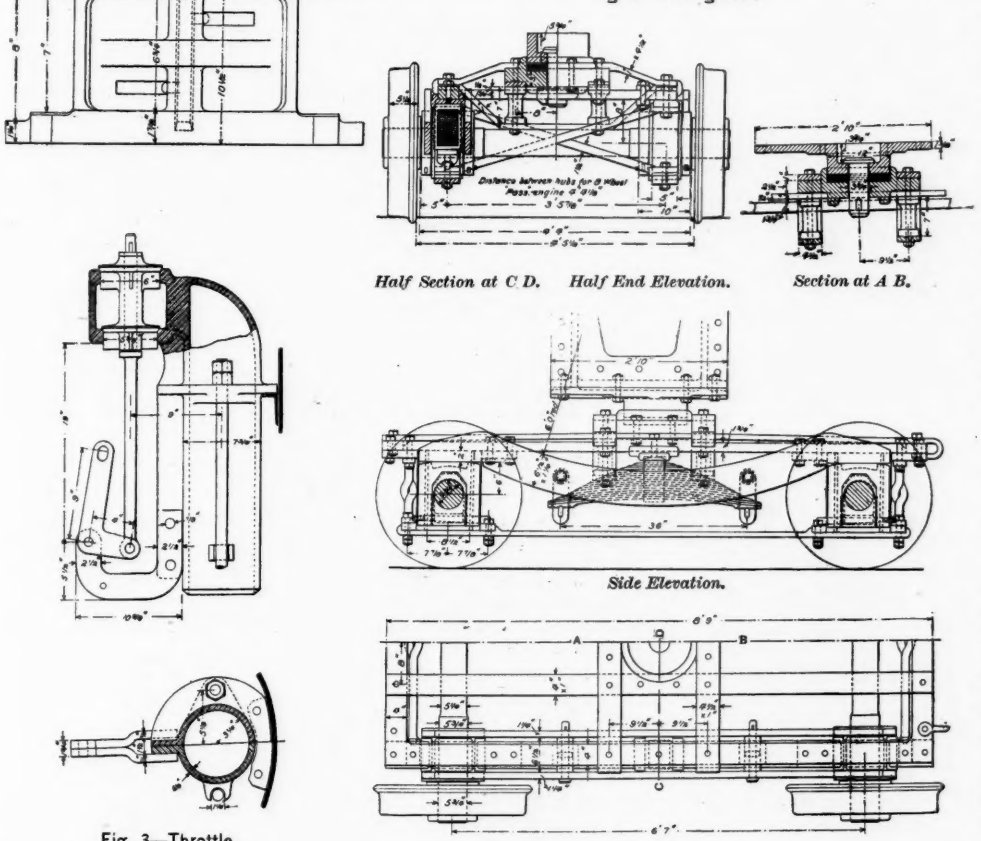


Fig. 2—Driving Box.



Half Section at C D. *Half End Elevation.* *Section at A B.*

Side Elevation.

Half Plan.

Fig. 1—Details of Truck.

Fig. 3—Throttle.

DETAILS OF CLASS "Y" LOCOMOTIVE—C., C., C. & ST. L. RY.

The wheels are 33 in. in diameter, cast iron spoke centre, with steel tires held, with Gibson's fastener.

The driving box is shown in fig. 2; this as it shows the method of supporting the springs from the under side of the box. There is a hole 2½ in. in diameter in each leg of the box, and this has a steel bushing reducing it to 2 in. in diameter; through these holes pass the pins that support the spring hanger. The box is of phosphor-bronze.

The throttle is shown in fig. 3, and the branch pipe and method of attachment to the dry pipe and tube sheets are shown in fig. 4; they will be readily understood from the drawings.

A 150-Ton Steam Pillar Crane.

A 150-ton dock crane was recently completed and tested at Glasgow, Scotland. The building of the crane was prompted by the great increase in the sizes and weights of marine engines and boilers constructed in the Glasgow district, and the lack of adequate facilities for handling them.

That with so large and heavy a piece of machinery and the character of its location, on the river front, the construction of the foundation should figure prominently in the work is at once evident. As a matter of fact, in this case it was tedious and difficult. In order to get the full advantage of the sweep of the crane, it became necessary to project the river face of the seat to the extent of 5½ ft. at the cope level of the dock wall, but even though an extension had not been necessary the wall would have been unable to carry the weight. Accordingly, about 52 lineal feet of the dock wall was removed, a 9-in. thick sheet pile, tongued and grooved cofferdam was built to keep the tide out, and sheet piles were driven on the other three sides to prevent the ground from slipping. As soon as the cofferdam was completed the dock wall and the underlying timber sills and runners were removed, and the inclosure was excavated to 28 ft. below the cope level. Concrete cylinders of 9 ft. 7½ in. external and 5 ft. 9½ in. internal diameter were then sunk, three triple groups being placed in front, four single cylinders close behind them, and three triple groups at the back. The cylinders all rest upon cast iron shoes, and the front groups are at a depth of about 32 ft. 8 in., the single cylinders at a depth of 31 ft., and the back groups at a depth of 28 ft., or at depths of about 60 ft. 8 in., 59 ft. and 59 ft. 6 in., respectively, below the level of the dock wall. The tops of the front cylinders are 25 ft. below the cope level, and those at the back and at the middle 22 ft. 6 in. All the cylinders are filled with Portland cement concrete, and support the mason work, which is 40 ft. square and rises to 45 ft. above the top of the front cylinders, and to 20 ft. above the level of the quay wall. It consists of concrete rubble, faced to the level of the cope of the wall on the water side, with granite quoins and the redressed freestone ashlar of the old wall, and on the other three sides with heavy rubble. From the level of the quay up, the facing is of granite quoins at the corners, with ashlar concrete in courses, surmounted by a granite cope 3 ft. thick and of a minimum width at the centre of each side of 7 ft., and at the corners of 14 ft. The total weight of the masonry above the cylinders is 4,300 tons.

The crane itself revolves on steel rollers working on a steel track. The centre is a 9-ton casting, held down by six steel bolts, each 38 ft. 9 in. long and 5 in. in diameter. These are fixed to six washer plates and 6 ft. square, and built at intervals into the foundation at a depth of 30 ft. Two brick-lined tunnels 2 ft. wide 6 ft. high afford access to the lower ends of the bolts. The steel centre pin in the centre casting is 17 in. in diameter and weighs six tons. The roller path is 33 ft. in diameter and weighs 12 tons. In the roller ring there are 75 cast steel rollers of a maximum diameter of 14 in., weighing, in all, about 10½ tons.

The framing, shafting and jib are of mild steel, and the gearing, in great part, is of cast steel. The framing is 27 ft. high and weighs 50 tons. The jib, made up of two tubes, each 3 ft. 3 in. in diameter at the centre, is 90 ft. long, and, including stays, weighs 45 tons. Its extreme height from the quay level is 110 ft. The centre of the jib-head pulleys for heavy loads, which are 5 ft. 3 in. in diameter, is 100 ft., and for light loads, the pulleys for which are 2 ft. 6 in. in diameter, 107 ft. 6 in., above the level of the cope of the quay wall. The single tension rods are 10 in. by 2¾ in., and the double tension rods 10 in. by 1½ in., and the diameter of the pins 8 in. The whole weighs 8 tons. The diameter of the hoisting drum is 5 ft. 2 in., its length 10 ft. and its weight 10½ tons. The gearing of the crane weighs eight tons, the castings are in all 120 tons, and the crane, in working order, exclusive of back balance, is 270 tons. In the ballast box are 100 tons of iron and steel punchings. The crane has two speeds for heavy lifts, 130 and 60 tons, and two for light lifts, 20 and 8 tons, respectively. The engine for the heavy lifts has two cylinders, each 12 in. diameter and 16 in. stroke, and the engine for light lifts, two, 8 in. diameter and 12 in. stroke. There are two speeds for revolving, and the engine for this purpose has two cylinders, each 8 in. diameter and 12 in. stroke.

The boiler weighs six tons, and is 6 ft. in diameter and 14 ft. high. Steel wire ropes are used for lifting and lowering.

The radius of the sweep for the heavy loads is 65 ft. and for the light loads 69 ft. 9 in. In the test which was made, a 60-ton load was lifted at the rate of 8 ft. 10½ in a minute, and a 130-ton load at the rate of 4 ft. per minute. One complete revolution was made with the former load in 2 min. 17 sec., and with the latter in 5 min. To prevent the possibility of overloading, the crane is provided with a 160-ton hydrostatic weighing machine. The maximum lifting capacity is 150 tons. The total cost of the crane and seat was somewhat under $80,000.

The builders were Messrs. Cowans, Sheldon & Co., Ltd., of Carlisle, England, and the work was commenced in the fall of 1890. We are indebted to the *Iron and Steel Trades Journal* for these particulars.

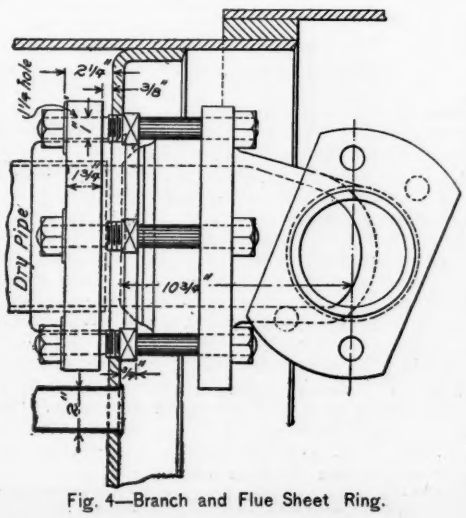


Fig. 4—Branch and Flue Sheet Ring.

The Lafayette Train Accident.

We print below the main facts that have been ascertained in the search for the cause of the disaster at Lafayette, Ind., which occurred on May 7 last and was reported in the *Railroad Gazette* of May 7, page 357. That report was substantially correct, as far as it went, except that, according to the present report, the whistle signal for brakes was not given until the train was within about 1,200 ft. of the point of derailment.

The train left Chicago Saturday evening, running to Kankakee, Ill., over the Illinois Central tracks, 56 miles, drawn by engine 929, Engineer Steuber. This engineer states that 18 stops were made and the brakes worked perfectly in every respect. At Kankakee "Big Four" engine No. 180, 10-wheeler, Engineer Welsh, was attached to the train. From this point the train consisted of engine 180, with American outside equalized brake, and the following cars:

Mail car No. 12, four-wheel trucks, quick action brake.
" " " 23, six " " slow " " middle truck wheels not braked.
Baggage car No. 69, four-wheel trucks, quick action brake.
Combination car 158, " " " " " "
Day car No. 353 " " " " " "
Parlor car No. 279 " " " " " "
Wagner sleepers Nos. 190, 191 and 402.

The tender, baggage and two mail cars were piled up on the engine and totally wrecked. The combination car, coach and parlor car were derailed, but no damage was done to triple valves or cylinders. The three sleep-

ing cars were uninjured. All cars, except mail car 23, had National hollow brake beams, with heavy rods and levers.

From 'Kankakee to Templeton, 56 miles, numerous stops were made and the brakes performed their work perfectly. In stopping at the latter station the engine ran a half car length past the water tank. Upon backing up a quick action was had when the stop was made. From Templeton to Lafayette, 18½ miles, no stops were made. This distance was covered in 37 minutes. About the time the gravel pit (see sketch) was passed the conductor felt a decided lurch, and shortly after, about the time the train reached the foot of grade, a whistle signal for brakes was given, followed at short intervals by two more.

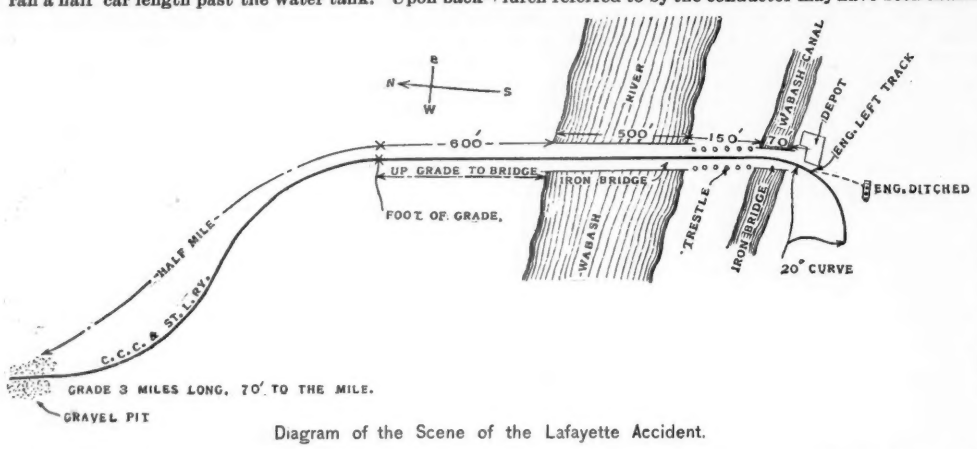


Diagram of the Scene of the Lafayette Accident.

The conductor claims that when the whistle was first sounded he opened the conductor's valve in the day car, getting a discharge of air from the valve, but no brake application. The baggageman also says he opened the conductor's valve in the combination car, which caused a discharge of air but no application of brakes. It seems doubtful, however, whether a discharge of air could be heard with the train moving at a high rate of speed, as the valve is located within a tightly closed closet. Statements regarding the speed of train are very confusing, but from the best information obtainable it is estimated at not more than forty or forty-five miles an hour when crossing the river bridge and thirty miles at the time of derailment. One hour and thirty minutes after the accident a freight train arrived. The engineer made two attempts with a heavy ten-wheel engine to pull back the three sleeping cars, but was unable to move them until the brakes had been released on two of them by bleeding. These cars proceeded on their journey shortly after.

The day after the accident the triples on cars 158, 383 and 279 were found all clean and properly lubricated, and the teat of each piston rested on the graduating stem. The conductor's valves alleged to have been opened by the conductor and baggageman were in perfect working condition. The valve which the conductor claims to have opened was closed. The other was partially open, the handle being badly bent downward and backward, and somewhat twisted. None of the cars in the train had a cord attached to the valve handle.

The engine was badly wrecked and little satisfactory information could be got from an examination of it, but the tires showed no signs of hard grinding, and the engine evidently was not reversed when it left the track. While the lever, as the engine lay on its side, was well back of the centre, the indications were that it had been thrown to that position by a considerable force. Quite a number of the quadrant teeth had been broken off and several others were bent backwards. Corresponding teeth on the latch were bent forward. The reverse lever was bent backward to nearly a right angle, the bend being just above the quadrant. It appeared conclusive that the latch had been violently raked backward over the quadrant. The tender frame was crushed so that nothing could be learned as to the brake apparatus.

After the pump had been removed from the engine, it was set up in the shop with ¾-in. steam and air pipes and exhaust of 1¼ in. When steam was turned on, it started promptly, and in various severe tests, it behaved in a perfectly satisfactory manner. Subsequently the pump was coupled up with all pipe connections standard, and as before proved to be in perfect working condition. The engineer who ran the engine to Kankakee the day previous to the accident said the pump and brake apparatus worked all right, and Engineer Welsh of the ill-fated train had never reported any trouble from air brakes during the three weeks he had run this engine. The foreman at Kankakee was at the station when the engine was coupled to the train, and saw the brakes tested; they were working nicely.

There is no evidence that tramps were on the train. At the gravel pit gravel was piled up from 12 in. to 18 in. in height on either side of the main track and cobble stones of all sizes to 6 in. or more in diameter were common. As the pit is near the foot of the grade, even had a cook been closed by a cobble the maximum brake force could have been applied by opening the conductor's valve.

From the best information gathered, the only conclusion is that either the brake valve was on lap, or the stop cock below the brake valve was closed, or a train pipe cock was closed at the front end of the train. In the latter two cases it must be assumed that no conductor's valve was open when the brake signal was sounded, unless very shortly before the engine left the track. The lurch referred to by the conductor may have been caused by the application of the driver brakes when the engineer endeavored to set the train brakes, assuming that a train-pipe cock was closed behind the engine.

Self-Acting Injectors with Adjustable Cones.

The chief advantage of an injector with adjustable cones—*i. e.*, cones in which the actual spaces for the admission of steam and water are adjustable—over an injector with fixed cones is that the former works equally well at any boiler pressure, whereas the fixed cone injector works best only at one fixed pressure. A further advantage possessed by an adjustable injector is that it will deal with hotter feed-water, and that the quantity of feed delivered is capable of considerable variation. This double adjustment has hitherto been found inapplicable to self-acting injectors, owing to their construction entailing divided combining nozzles (see figs. 4 and 6). The difficulty has been overcome by the device embodied in the injectors manufactured by Messrs. Holden & Brooke, of Manchester, which we illustrate. Fig. 4 shows their standard adjustable self-acting injector, known as their 1890 pattern, which will work at any pressure from 15 lbs. to 200 lbs. per square inch. Figs. 1, 2 and 3 show the details of the adjustable mechanism on a larger scale. The spindle *V*, which simply rotates, gives a longitudinal sliding movement to the steam nozzle *N*, the result of which is to simultaneously alter the steam and water spaces in the steam nozzle and combining nozzle respectively. As the steam nozzle moves forward from the position shown in fig. 2—in which steam is entirely shut off and the water space fully open—the effect is to gradually increase the steam area at *e* from *nil* to its maximum—see fig. 1—and to decrease the water area at *f* from its maximum to its minimum area. For the higher steam pressures the position of the steam nozzle is near to the spindle, while for the lower pressure it assumes the position shown in fig. 1, where the water area is small and the steam area large. The steam nozzle and spindle when brought into contact, as in fig. 2, form a valve *d*, which entirely shuts off steam from the injector. The collar *E* prevents the spindle *V* from traveling longitudinally and the key *K* prevents the steam nozzle from revolving. Figs. 5 and 6 show the same makers' 1892 combination injector for locomotives. This instrument is also self-acting, and has the same adjustment as the 1890 injector, but has, in addition, all the requisite boiler fittings self-contained, being fixed directly on to the boiler by a single attachment. A further feature of this injector is that the clack valve, together with its seating, can be removed under steam, and that the cones and whole interior of the injector can be readily removed by means of an ordinary spanner. From the above description it will be seen that the whole forms a neat boiler mounting, and considerably simplifies the detail of the engine to which it is applied, saving as it does the ordinary clack-box, steam valve and water cock, with their necessary complement of pipes, seatings, flanges and rods.

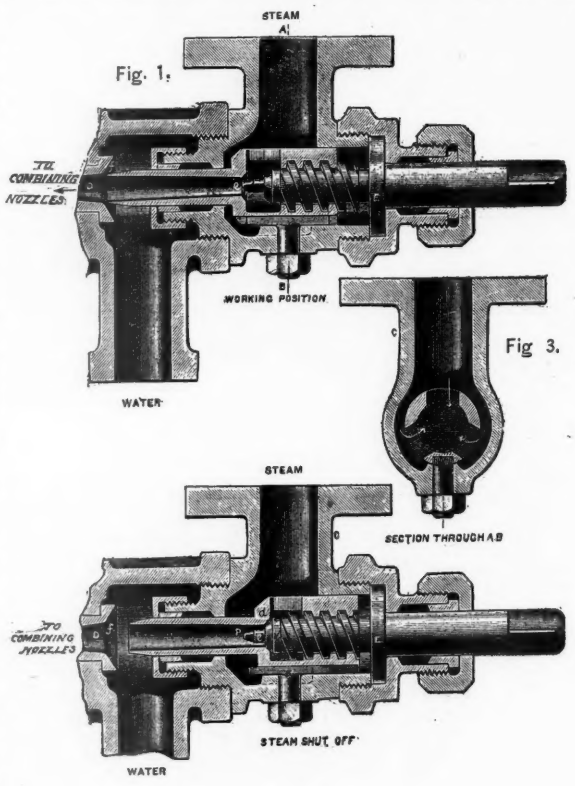


Fig. 2.

Self-Acting Injector, with Adjustable Cone.

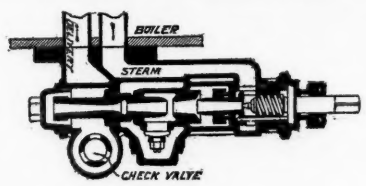


Fig 6.

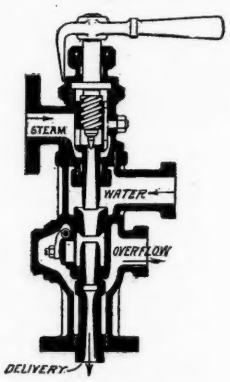


Fig. 4.

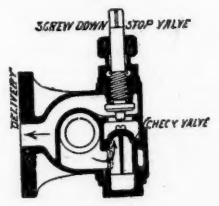


Fig. 5.

It will be noticed that the well-known double adjustment which hitherto, as in the original Giffard injector, has been obtained by two independent movements, is simplified down in the 1892 and 1890 injectors to a single movement requiring no skill on the part of the operator, and that the same handle also actuates the steam valve. The 1892 injector is, in fact, the only combination injector which, in addition to being self-acting, works equally well at all pressures from 15 lbs. to 200 lbs. per square inch, gives a variable quantity of feed at any pressure, and deals with heated feed water.

Since their introduction Messrs. Holden and Brooke have received large orders for these injectors from various railroad companies and locomotive builders, and there is every indication that the 1892 is the injector of the future for locomotives. Among the English engines exhibited at Chicago these injectors are fitted on the locomotive sent by Mr. Winby, of London.*—*The Engineer.*

Proposed Uniform System of Nomenclature for Iron and Steel.

A short time ago the royal (Austrian) technical and administrative military committee requested the Austrian Engineers' and Architects' Society to prepare a list of suitable and distinctive names for the different varieties of iron and steel in current use. A special committee, appointed by the Society to take the matter in hand has just made its report, in which it recommends the appended system of classification: I. *Pig iron: a*, white pig; *b*, mottled pig; *c*, gray pig. II. *Wrought iron: a*, forge iron; *b*, ingot iron. III. *Steel: a*, forge steel; *b*, ingot steel. IV. *Castings: a*, ordinary iron castings; *b*, ingot iron castings; *c*, steel castings. Referring to this classification more in detail, the committee define pig iron as the ordinary blast furnace product, easily melted, but not weldable. According to its color and structure, it is sub-divided into the white, mottled and gray pig iron, and is further distinguished as coke pig or charcoal pig, depending upon the kind of fuel used in its manufacture. Cast iron, the committee explains, is, as a rule, the gray pig, and, exceptionally, the mottled pig, which is used for general casting purposes.

Forge iron, one of the varieties of wrought iron, is defined as the metal obtained in a pasty mass by the open hearth or puddling process, and which will admit of being forged and welded without, however, admitting of being sensibly hardened. Ingot iron is the variety of iron made in a liquid state by the Bessemer, Thomas or Martin processes, forgeable, but also not capable of being sensibly hardened. If it be desirable to specify the particular method of manufacture followed, the simple name "ingot iron" may be supplanted by the names "Bessemer, Thomas, acid or basic Martin ingot iron," or the name of the process may be added in parenthesis to the term ingot iron.

Forge steel is defined as the product of the open

* See *Railroad Gazette*, May 19.

hearth or puddling processes, admitting of being forged and sensibly hardened. The name here too may be made more definite by adding in parenthesis either open hearth steel or puddled steel. Ingot steel is steel made by the crucible, Bessemer, Thomas, or Martin processes, capable of being forged and hardened. The names of the processes may again be used as additional specifications of the particular varieties. The term "cast steel" is abandoned and in its place is used the term "crucible ingot steel."

As to castings, the ordinary iron castings call for little in the way of definition, being made of gray or mottled pig iron. Those that have been treated so as to admit of a moderate degree of forging are specified in the already familiar way as malleable castings, soft castings, or tempered castings. Iron castings, poured in iron molds so as to have a hardened surface, are to be known by the already current name of chilled castings. The name "ingot iron castings" also seems to explain itself. Steel castings are castings of ingot steel.

Brooks Passenger Engine for the Lake Shore & Michigan Southern.

The locomotive shown in the accompanying engraving is one of five which have just been built by the Brooks Locomotive Works, Dunkirk, N. Y., to haul the New York & Chicago 20-hour express trains over the Lake Shore & Michigan Southern road. This engine, American type, is designated Class 17—A, and the most noticeable feature in which it differs from the other passenger engines on this road is the size of the driving wheels, which are 72 in. in diameter. The cylinders are 17 in. in diameter and the stroke is 24 in. The principal dimensions are as follows:

Cylinders	17 × 24 in.
Drivers, diam.	72 in.
Wheel base of engine	23 ft. 9 in.
Driving wheel base	9 ft.
Total wheel base of engine and tender	45 ft. 8 in.
Weight of engine in working order	104,600 lbs.
Weight of engine on engine truck	39,500 "
Weight of engine on main drivers	33,100 "
Weight of engine on back drivers	32,000 "
Weight of tender loaded	70,000 "
Boiler:	
Working pressure	180 lbs.
Waist, diameter at smokebox	52 in.
Waist, diameter at throat sheet	60 in.
Tubes, number 200; diam.	2 in.
Tubes, length	12 ft.
Firebox, inside	78 × 34 in.
" depth, back	79 in.
" " front	81 in.
Heating surface, firebox	155 sq. ft.
" " tubes and arch pipes	1,258 "
" " total	1,413 "
Machinery:	
Steam ports	1⅝ × 16 in.
Bridges	1⅝ in.
Exhaust port	3 × 16 in.
Valve ports	⅝ × 16 in.
Valve, lap outside	1 in.
" " inside	⅛ in.
" lead in full gear	3/16 in.
" travel, maximum	6½ in.
Eccentric travel	5 in.
Link radius	68 in.
" face	3 in.
" centres of eyes	13 in.
" block-wearing face	5 in.
" block flanges	7⅛ × 3½ in.
" saddle pin	1¾ × 6 in.
" rocker pins, top and bottom	1¾ × 4 in.
" hanger centres	18½ in.
" lifter arms, length	20½ in.
Driving axles, journals	7½ × 9 in.
Crank pins, main	4½ × 6 in.
" " " coupling	5¼ × 4 in.
" " " wheel fit	5⅝ × 7 in.
" " back	3½ × 4 in.
" " " wheel fit	4 × 7 in.
Frames, forged solid	3¾ × 4½ in.

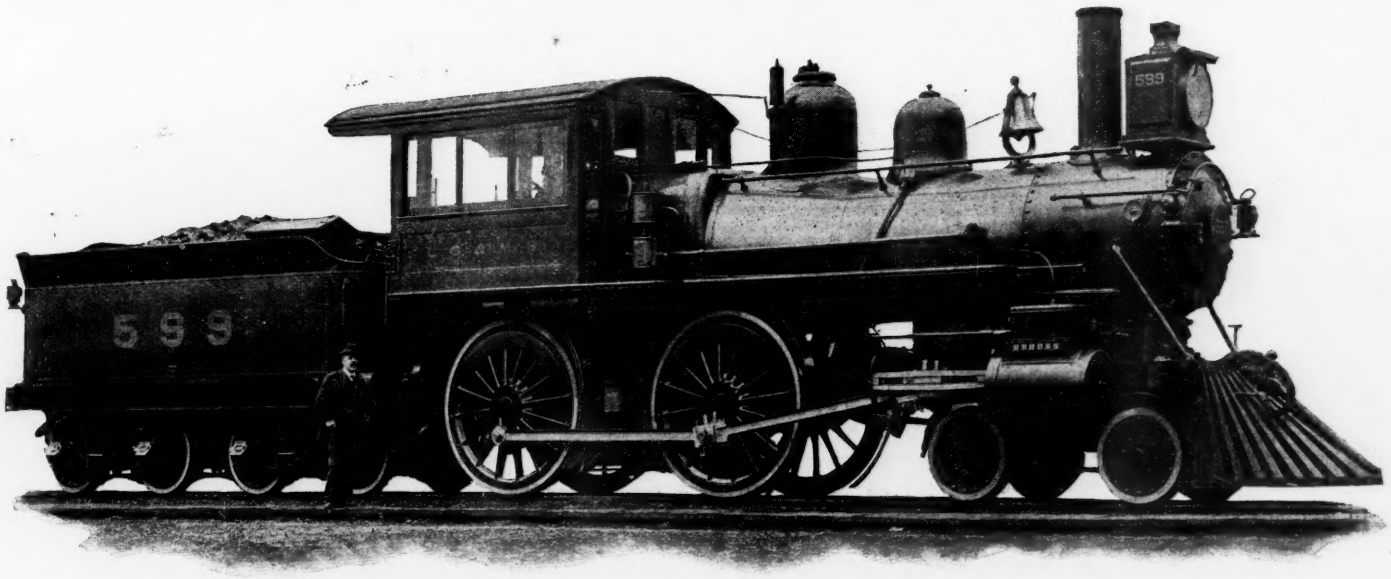
The fuel for these engines is bituminous coal. The boiler is of steel of the "improved, wagon-top Belpaire type," with dome on the connection sheet. The sheets vary from 7/16 to ⅝ in. in thickness. The longitudinal seams are riveted, quadruple lap, without welt. The circumferential seams have a double lap. The tubes are made of charcoal iron. The firebox has a brick arch, carried on three 2½-in. water tubes. There is one Richardson muffled safety valve and one plain one. The deflector in the extension front is in front of the exhaust pipe, which latter is double. The stack is cast iron, straight, 16 in. in diameter. The firebox is fitted with cast iron rocking bar grates.

The cylinders have Dunbar packing, and Jerome packing is used in the piston rods and valve stems. The engine has Allen-Richardson valves and Player's patent multiple-latch reversing lever. It also has Player's patent frame pedestal ties.

The driving wheels have Midvale steel tires with Mansell retaining rings, and the driving axles are of hammered iron. The connecting rods are of hammered iron, fluted and put on with straps and keys. The parallel rods are of Midvale steel, fluted and fitted with brass bushings. The engine truck has Allen paper wheels 33 in. in diameter, and the axles are hammered iron. The journals are 5 in. × 10 in. Detroit springs are used both for the drivers and in the forward truck. The injectors are No. 8 Monitor, and a No. 9 Nathan triple lubricator is used for the cylinders. The oil cups on the rods and eccentrics have adjustable spindle feed.

The engine is fitted with the Westinghouse brake on the drivers and tender, and has the Westinghouse train signal. It also has connections for the railroad company's standard steam heating for passenger trains.

The tender frame is of 10 in. channel steel, and the tank is made of steel 7/16 in. and ¼ in. thick. The tank will hold 3,100 gallons of water and 6 tons of coal. It has the improved Ramsbottom water scoop and the Gould coupler. The tender truck has Allen paper wheels 36 in. in diameter. The bolsters are of steel I-beams. The axles are hammered iron and the journals 4 in. × 7 in.



BROOKS PASSENGER ENGINE FOR THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

Train Accidents in the United States in April.

COLLISIONS.

REAR.

2d, on Pennsylvania road, at Allegrippus, Pa., a freight train descending the steep grade broke apart and the forward portion, soon becoming uncontrollable, ran into the rear of a preceding freight, wrecking 3 engines and 29 cars. One brakeman was killed.

4th, 7:30 a. m., on Manhattan (elevated), at Eighth avenue and 135th street, New York City, a passenger train ran into the rear of a preceding passenger train, doing considerable damage. There was a dense fog at the time. It is said that the automatic block signals "were put in use later in the morning."

6th, on the New York Central & Hudson River, at Albany, N. Y., a freight train descending a grade broke apart and the rear portion afterward ran into the front portion, derailing several cars of oil. The wreck took fire and most of it was burned up, together with two signal towers.

7th, on Union Pacific, near Lexington, Neb., passenger train No. 9 ran into a freight car which had been blown out of a side track, making a bad wreck. A tramp was injured.

8th, on the Pennsylvania road, near Lamberton, N. J., a freight train ran into the rear of a passenger train, injuring the passenger conductor.

12th, 3 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, at London, Ind., a freight train ran into a car which had been blown out from a side track, derailing the engine. The engineer was killed and 2 other trainmen injured.

12th, on Denver & Rio Grande, near Howard's, Col., a freight train descending a grade broke in two, and the rear portion ran into the forward one, wrecking 32 loaded cars, 3 of which contained ore said to be worth $1,800 a ton. A brakeman was injured.

13th, on Grand Trunk road, near Chesterfield, Mich., a passenger train ran into 2 freight cars which had been blown out from a side track, ditching the whole train. A baggageman was injured.

15th, on Philadelphia & Reading, at Skillmans, N. J., an empty engine ran into the rear of a train of empty passenger cars, injuring 3 trainmen. There was a dense fog at the time.

17th, on New York Central & Hudson River, at Shortsville, N. Y., a westbound passenger train ran over a misplaced switch and into some freight cars standing on the side track. The engineer was injured.

18th, on Pennsylvania road, at Latrobe, Pa., a freight train broke in two, and the rear portion afterward ran into the forward one, wrecking 6 cars. A telegraph operator riding on the train was killed.

20th, on Pennsylvania road, at Conemaugh, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, making a slight wreck. One brakeman was killed and another injured.

20th, on Cincinnati, New Orleans & Texas Pacific, at Retro, Tenn., a passenger train ran into a freight car which had been blown out of a side track, and all the cars but one were derailed. The engine was overturned and the engineer injured. The collision was violent and the fortunate outcome is attributed to the fact that the cars were new and strong and equipped with Pullman vestibules.

23d, on New York, Chicago & St. Louis, in Cleveland, O., a freight train ran over a misplaced switch and into some freight cars standing on the side track, wrecking several cars and an adjoining building. Two men at work near the track were injured.

25th, on Old Colony, near Canton Junction, Mass., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, derailing 5 cars. A brakeman was injured.

25th, on New York, New Haven & Hartford, at Wilton, Conn., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, doing considerable damage. A brakeman was killed and the conductor was injured.

30th, on Pennsylvania road, near Roberstown., Pa., a freight train ran into the rear of a preceding freight, wrecking engine, caboose and 7 cars; fireman injured.

And 9 others on 7 roads, involving 3 passenger and 12 freight and other trains.

BUTTING.

3d, on Jacksonville Southeastern, near Glen Carbon, Ill., butting collision between a passenger train and a freight, wrecking both engines and 2 freight cars. Three trainmen and 2 tramps were killed, and 5 passengers and 2 trainmen injured. The conductor and engineer of the freight forgot about a change in the schedule of the passenger train, which had taken place the day before.

5th, on New York Central & Hudson River, at Victor, N. Y., butting collision of freight trains, wrecking both engines and several cars. One engineer was injured. It appears that one of the trains approached a meeting point at uncontrollable speed.

7th, on Atchison, Topeka & Santa Fe, at Forth Worth, Tex., butting collision between a stock train and a yard engine, damaging both engines and one car. The engineer was injured.

11th, on East Tennessee, Virginia & Georgia, near Brice, Ga., butting collision of freight trains, injuring 3 trainmen.

17th, on Toledo, Ann Arbor & North Michigan, near Farwell, Mich., butting collision between a passenger train and a work train which was running backward. Two trainmen were killed and 3 injured.

17th, on San Antonio & Aransas Pass, at Waco, Tex., butting collision between a stock train and a freight, making a bad wreck. The woodwork of the locomotive was burned up and the fireman was burned to death. The engineer was also badly injured.

21st, on Toledo, Ann Arbor & North Michigan, near Emery, Mich., butting collision between a freight train and an empty engine running backward; 1 fireman killed and an engineer injured. It is said that the engineer of the freight forgot an order, which had been given to him, to keep out of the way of the empty engine.

24th, on Lehigh Valley, near Tamanend, Pa., butting collision of freight trains, wrecking both engines and 16 cars. Two brakemen were injured. It is said that the conductor of the west-bound train, which belonged to the Pennsylvania road, overlooked or misunderstood an order to wait at Tamanend.

26th, on Cleveland & Pittsburgh, near Brilliant, O., butting collision between a freight and a work train, wrecking both engines and about 20 cars. The freight engineer was injured. It is said that the freight had had orders to keep out of the way of the work train.

27th, on Baltimore & Ohio, near Belmont, O., butting collision of freight trains, badly damaging both engines and several cars. One engineer jumped and was injured.

28th, on Boston & Maine, at Madbury, N. H., butting collision of freight trains; conductor and 2 brakemen injured.

And 14 others on 13 roads, involving 4 passengers and 24 freight and other trains.

CROSSING AND MISCELLANEOUS.

4th, on Pennsylvania road, near Greensburg, Pa., a collision of freight trains resulted in the death of 1 brakeman and the injury of 5 other trainmen.

6th, in Sioux City, Ia., a switching train of the Illinois

Central ran into a similar train of the Sioux City & Pacific at a crossing of the two roads, doing slight damage. One trainman was injured.

6th, on the Michigan Central, at New Buffalo, Mich., a passenger train ran into a freight standing on the main track, making a considerable wreck. The engineer was injured, probably fatally.

7th, on the Pennsylvania road, at Tomhicken, Pa., a passenger train ran into a freight which was entering a side track, but had not fully cleared the main line. One fireman was injured.

13th, on Great Northern, at Laramore, N. D., a passenger train drawn by two engines ran into an empty engine, making a bad wreck. Four trainmen were injured.

14th, on Pennsylvania road, near Langhorne, Pa., collision of freight trains, making a bad wreck and killing 1 brakeman.

15th, on Fonda, Johnstown & Gloversville, near Johnstown, N. Y., collision between a freight and passenger train, doing considerable damage and injuring 3 trainmen.

19th, on Western & Atlantic, near McIvors, Ga., a freight train which had stopped to cool a hot box was run into at the rear by a following freight, derailing several cars and blocking the road. A passenger train being delayed, its passengers were taken by an engine which started for Atlanta; but near Vinings, this engine collided with an engine without train, carrying the Superintendent to the wreck. Two passengers who jumped out through windows were injured.

20th, on Pennsylvania road, near Spring Mills, Pa., a switching train at work on the main track was run into by a heavy freight train from the north, making a very bad wreck. One brakeman was killed and 4 other trainmen injured.

22d, 5 a m., at Eureka, Tex., a freight train of the Missouri, Kansas & Texas ran into a freight of the Houston & Texas Central at the crossing of the two roads, wrecking 1 engine and 7 cars. The engine was overturned and fell against some cars on a side track occupied by telegraph linemen who were asleep. Four of these men were badly scalded. It is said that the engineman at fault did not know the road very well and was using steam when he approached the crossing.

29th, on Baltimore & Ohio, at Griffin, Pa., a passenger train ran into a freight train at a cross-over track, making a bad wreck; conductor, fireman and 1 passenger injured.

And 10 others on 10 roads, involving 3 passenger and 17 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

5th, on New York & Northern, at Whitson, N. Y., a freight train was derailed by spreading of rails, and the tender and 4 cars fell down a bank. A brakeman was injured.

8th, 3 a. m., on the Louisville, New Albany & Chicago, near Rossville, Ind., a passenger train broke through a bridge, wrecking the engine. The engineer and fireman were injured, the latter fatally.

18th, 9:30 p. m., on St. Louis, Iron Mountain & Southern, at Victoria, Mo., a passenger train was derailed by a broken rail and 3 trainmen and 6 passengers injured.

19th, on West Virginia & Pittsburgh, at Centralia, W. Va., the engine of a freight train was derailed and overturned by a broken switch. In getting the tender back upon the track 5 workmen were injured, some of them fatally.

28th, on Iowa Central, at Winfield, Ia., a freight train was derailed at a defective switch; 1 trainman injured.

30th, on Kansas City, Wyandotte & Northwestern, in Kansas City, Kan., a switching engine was derailed at a defective switch and overturned. The engineer was killed and the fireman badly injured.

And 7 others on 7 roads, involving 1 passenger and 6 freight and other trains.

DEFECTS OF EQUIPMENT.

1st, on Michigan Central, near Ketcham, Wis., 18 cars of a freight train were derailed by a broken journal. One brakeman was killed.

12th, on Louisville, New Albany & Chicago, near Crawfordsville, Ind., a freight train descending a steep grade was derailed by a broken wheel. The derailed cars ran upon the trestle approach to an iron bridge and broke through, wrecking the trestle and knocking down one span of the iron bridge. Twelve cars altogether were wrecked.

23d, on Cleveland & Marietta, near South Olive, O., the engine and first two cars of a passenger train were derailed by the breakage of a flange of a front truck wheel of the engine, and ran against the bridge over Duck Creek, which gave way and let the derailed vehicles fall into the water. The engineer and fireman went down with the engine, but got out alive.

27th, on Louisville & Nashville, near Oxmoor, Ala., 2 cars of a freight train were derailed and wrecked by the breaking of a drawbar; conductor and 1 brakeman injured.

And 11 others on 11 roads, involving 1 passenger and 10 freight and other trains.

NEGLIGENCE IN OPERATING.

4th, on Brooklyn Elevated, in Brooklyn, N. Y., a passenger train ran over a misplaced switch and was derailed. The engine and forward car ran some distance on the sleepers. It is said that the engineman disregarded a signal which should have given him ample warning.

4th, midnight, on Jacksonville, Tampa & Key West, near Palatka, Fla., a freight train ran into an open draw bridge, and the engine and 6 cars fell into the river; the engineer, fireman, wood passer and a drover were killed.

10th, on Philadelphia & Reading, near Macungie, Pa., an engine ran over a misplaced switch and upon a weak trestle, which gave way under it, making a considerable wreck. The engineman was injured.

28th, on Lake Shore & Michigan Southern, in Chicago, a switching freight train ran upon the drawbridge at Ninety-second street when it was not fastened, and the engine fell into the river. The bridge tender, in attempting to jump off the bridge, fell into the river and was drowned. It is said that the train did not stop before reaching the bridge, as the rule required.

30th, on New York Central & Hudson River, at Albany, N. Y., a freight train broke in two just as a pushing engine was being attached to it, and a car was derailed by a drawbar which dropped out of place. The adjoining main track was obstructed and an eastbound freight ran into the wreck. Of the latter train the engine and 3 or 4 cars were badly damaged and 1 brakeman was injured. The wreck took fire, but the flames were soon extinguished.

And 9 others on 9 roads, involving 2 passenger and 7 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

1st, on West Jersey road, at Belle Plain, N. J., a baggage car in a passenger train was derailed by a bale of rags which fell from the station platform just as the train was passing at speed.

6th, on Central of Georgia, near Milledgeville, Ga., the engine and 3 cars of a mixed train were derailed by an iron bar lying on the track. The fireman and engineer were injured, the fireman probably fatally.

7th, on Florida Southern, near Bartow, Fla., a freight train was derailed and the engine and 3 cars overturned; the engineer was injured. It is said that a rail had been maliciously loosened.

12th, on Flint & Pere Marquette, near Meredith, Mich., a passenger train ran into a tree which had blown upon the track, badly damaging the engine and 2 cars. One passenger and 2 trainmen were injured.

20th, on Ohio River road, near Ceredo, W. Va., a passenger train, pushed by an engine, struck a derrick, hanging so as to foul the track, which fell upon the first car and overturned it. The car was on a bridge at the time and it fell off, landing 40 ft. below. The conductor, brakeman and 1 passenger were killed.

20th, on Philadelphia & Erie, at Blackridge, Pa., a freight train was derailed by a tree which had been blown upon the track, and the engine was overturned. The engineer and fireman were injured.

26th, on Southern Pacific, near Edna, Tex., a freight train was derailed by running over a cow, and the engine was overturned. The engineer and fireman were injured.

27th, on West Virginia & Pittsburgh, near Weston, W. V., a passenger train was derailed by spikes which had been maliciously placed upon the track. Engineer, fireman and 1 passenger injured.

27th, on Atchison, Topeka & Santa Fé, near Celeste, Tex., a passenger train was derailed by running over horses, and the engine and first 2 cars were ditched. Two passengers and 4 trainmen were injured, one of the latter fatally. The cars in this train had Pullman vestibules, and it is said that these greatly mitigated the disaster.

And 15 others on 15 roads, involving 10 passenger and 5 freight and other trains.

UNEXPLAINED.

1st, on Cincinnati, New Orleans & Texas Pacific, at Burnside, Ky., the caboose of a freight train was derailed at a frog. A signalman riding in the caboose jumped off and was killed.

8th, on Florida Central & Peninsular, at Maxville, Fla., a refrigerator car in a mixed train was derailed, doing considerable damage and ditching 2 other cars. An express messenger was injured.

8th, on Fitchburg road, at Winchendon, Mass., a car in a freight train ascending a grade with an engine at both ends was derailed and ran against a baggage car standing on an adjoining track. A drover was injured.

11th, on Richmond and Danville, at Mount Airy, Ga., a freight train was derailed, making a bad wreck. Twelve cars were piled up in a cut, and the engine and 4 cars fell down a bank. The engineer was killed.

12th, on Rome, Watertown & Ogdensburg, at Watertown Junction, N. Y., 5 cars of a freight train were derailed and wrecked and 4 trainmen injured.

20th, on Richmond & Danville, near Ayersville, Ga., the engine and several cars of a freight train were derailed and fell down a bank. The engineer was fatally injured.

24th, on Cincinnati, Dayton & Ironton, near Ironton, O., 3 cars of a mixed train were derailed on a bridge, making a bad wreck and destroying a portion of the bridge. The conductor detached the passenger car and stopped it in safety.

25th, on Union Pacific, near Parkers, Col., an empty engine was derailed and fell down a bank. The conductor was badly scalded.

And 18 others on 15 roads, involving 3 passenger and 15 freight and other trains.

OTHER ACCIDENTS.

1st, on Minneapolis, St. Paul & Sault Ste. Marie, near Sault Ste. Marie, Mich., a sleeping car in a passenger train caught fire, and 1 passenger who crawled out through a window was injured.

3d, on Choctaw Coal & Railway Company's road, near Red Oak, I. T., the engine of a freight train was wrecked by the explosion of its boiler, and 4 employés killed.

3d, on Baltimore & Ohio, near Connellsville, Pa., a switching engine was wrecked by the explosion of its boiler. Three trainmen were fatally scalded.

10th, on Central of New Jersey, near Green Brook, N. J., the engine of a passenger train running at high speed was badly damaged by the breaking of a parallel rod. The boiler was ruptured and the engineer and fireman badly scalded.

11th, on West Shore road, near Hampton, N. Y., a car in a passenger train was partially wrecked by an explosion, slightly injuring several passengers. The explosion was doubtless due to some substance carried by some passenger, but further than this no cause was discovered.

17th, on Toledo, Ann Arbor & North Michigan, near Emery, Mich., the engine of a freight train was wrecked by the explosion of its boiler and the fireman was killed.

26th, on Atchison, Topeka & Santa Fe, near Los Cerrillos, N. M., the engine of a passenger train was wrecked by the explosion of its boiler, and the engineer and fireman badly injured. Three cars were derailed.

And 2 others on 2 roads, involving 2 passenger trains.

A summary will be found on another page.

The Sao Paulo Railroad Situation.

The São Paulo Railway Co., Brazil, has issued a statement which is of interest as showing its position in the long series of disputes and recriminations over the various proposals which have been made during the past three years for relieving the congestion of traffic between Santos and the interior of the state of São Paulo. The São Paulo Railway Co. constructed its line under a concession of April 26, 1856. The capital was to be limited to £2,650,000, upon which the govenrment guaranteed 7 per cent. per annum. The actual capital expended exceeded that sum by £100,000, but the government refused to allow the excess. The concession was for 90 years, during which time no other railroad concessions were to be granted for lines within five leagues on either side of the São Paulo, and running in the same direction. This prohibition did not apply to roads which might start from the same point but follow different directions. It was also stipulated that the government might have the privilege of buying the road at the expiration of 30 years, and that if for any two consecutive years the earnings of the company should exceed 12 per cent. on the authorized capital the government might compel a reduction of rates. Since the construction of this line three other roads have developed extensive systems in the interior of the state, viz., the Paulista, the Mogyana, and the Sorocabana. The congestion of traffic began in 1891, due in part to inadequate track facilities, which were aggravated by the system adopted by the São Paulo road of drawing its cars up the steep grades to the central plateau by cable traction. Wharfage and warehouse facilities at Santos were also entirely insufficient. The three interior lines, seeing their opportunity, sought to acquire concessions for extensions to the coast. The São Paulo company then offered to improve the habor and terminal facilities at Santos, and to double track their whole line, provided that the new capital to be invested, estimated at about £3,000,000, should be placed upon the same footing as the old capital, extending the time of purchase an additional 30 years, and granting it the right to net earnings of 12 per cent. before any reductions in rates could be ordered. Meantime the government had granted concessions to the rival lines as follows: One to the Sorocabana from Santos to São João; another to the Paulista from São Sebastião, a port to the northeast of Santos, with the additional privilege of building a branch from São Sebastião to Santos; and a third to the Mogyana for a line from Santos to Resaca. The proposition of the São Paulo company was rejected without comment. Petition was accordingly made to congress, which authorized the Minister of Public Works to consider proposals from the São Paulo Co., but the terms the government offered as a result of this action were not accepted by the road. The state of São Paulo now drew up a contract with the company, subject to ratification by the Minister of Public Works. The government in answer to this renewed its former demands, insisting that the São Paulo Co. should not only double track its line, but construct a new narrow gauge road, that it should renounce its privileged zone, and submit to purchase by the government at the end of 20 years. The company has consequently abandoned negotiations. The government has, however, restricted the concession of the Paulista line to a single port terminus at São Sebastião, although the concessions to the Sorocabana and Mogyana lines, which equally trench upon the old road's rights, have so far not been modified. Harbor and wharfage improvements at Santos have been in progress by the government for some time, but there is no prospect of facilities being greatly increased by the arrival of the next coffee crop, at which time the congestion is most strongly felt. The Sao Paulo Co. is putting in an electric installation on its inclines, so as to operate them at night, and thus to some extent relieve traffic to and from the interior. The gross receipts of this road for the last half year of 1892 amounted to $1,402,287, on 86½ miles of track. The operating expenses were 55.89 per cent. of the receipts.

Acetate of Soda for Heating Railroad Cars.

The acetate of soda method of warming railroad cars which, about ten or twelve years ago, received a good deal of attention abroad, has of late again been brought into prominence, German papers, among others, stating that it has been used experimentally on the Vienna street car lines during the past winter. From all accounts the results appear to have been quite satisfactory, and an extensive introduction of the system is recommended. The principle of the system, as is, no doubt, generally known, lies in the fact that acetate of soda, after having been brought to a state of fusion by the application of heat, will cool very slowly and crystallize and, during this crystallization process, will again give out the heat originally absorbed.

In probably the first practical application of this warming method, Messrs. Ancelin & Gillet, a French firm, introduced the fused salt into metal boxes, which were hermetically closed and put in a hot water bath to further heat them. After this they were ready for use in the cars. This system had the drawback of requiring much time for the preparation of the bottles, and their function was more or less irregular and unsatisfactory. Some of the bottles, it was found, would cool very slowly, retaining their heat for periods of from 7 to 8 hours, while others would become cold in a very short time, crystallization evidentally taking place but imperfectly if at all. M. Scholte, a Hollander, in attempting to overcome this defect, realized the important function exercised by atmospheric air in promoting crystallization of the fused salt, and, accordingly, provided the bottles with small air cocks through which air could be admitted. This modification led to good results. The bottles, as made by him, were of copper, about 6½ ft. long and 2¼ in. high, and held about 45 kilograms (100 pounds) of acetate of soda. They were fastened to the car floors and contained a copper coil through which steam could be passed to fuse the salt, the steam for this purpose being taken from pipes running along the sides of the cars Even with this arrangement, however, a comparatively long time—something like 30 or 40 minutes—was required to fuse the salt, and this, together with the difficulty of procuring the steam supply, prevented an extensive adoption of the method, notwithstanding its

quite satisfactory performance so far as warming effect was concerned.

Latterly, however, Mr. A. Sartiaux, Chief Engineer of the French Northern Railroad, has made further improvements in the system which are thought likely to secure more favor for it. Mr. Sartiaux provides inside of the soda receptacles a copper pipe coil having 10 return bends, the pipe being about five inches in diameter, and the total length of pipe amounting to about 26 ft. The two ends of the coil are arranged side by side, and the openings are plugged. Steam is forced through the coil by an injector. Inside the soda receptacle are metal partitions dividing it into five compartments, this arrangement being designed to facilitate transmission of the heat to the outside. The receptacles, as used on the French Northern road, are made of tinned mild steel, hold about 200 lbs. of acetate of soda, and weigh altogether about 59½ pounds. Fusion of the salt is accomplished in them in from 10 to 18 minutes, steam at 1½ atmospheres pressure being used in the coil.

During the past six months the system has been used on the fast trains of the Northern road between Paris and Calais, Boulogne, Lille, Mons and Jeumont, and is said to have given general satisfaction. The longest trip on these trains occupies about six hours, and at the end of this time only about five per cent. of the receptacles are found to have become quite cold, due, it is claimed, to improper handling when first heating them up.

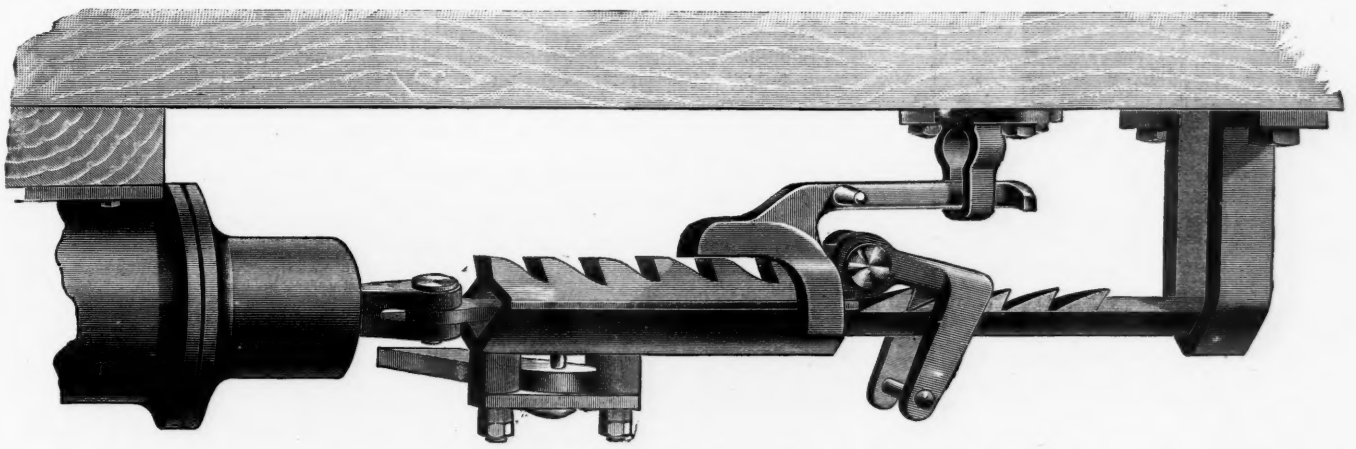
Experiments are now said to be in progress to heat the soda receptacles electrically, but nothing definite has yet been made public in regard to them.

Air Brake Adjuster.

The "O. K." slack adjuster, here illustrated, is designed to take up all the slack of the brake rigging which occurs by reason of the wear of the brakeshoes, thus keeping the piston travel at a definite amount and so securing an effective brake until the brakeshoes are worn out.

The necessity for such a device is obvious when it is remembered that the Master Car Builders have decided that the minimum piston travel shall be 6 in., the total travel of the piston being 12 in., so that but 6 in. is available for wearing out a full set of shoes. As ⅛ of wear upon each shoe causes two inches of piston travel, it is evident that ⅛ of wear would exhaust the piston travel and leave the brake powerless. In practice, however, the brake may become non-effective long before ⅛ of wear has taken place, owing to wear on truck bolsters and pedestals and the spring in brakebeams and brake rigging, which causes so much slack that the piston strikes the cylinder head and the brake is powerless. The "O. K." adjuster is designed to prevent this by bringing back the piston stroke to 6 in. as soon as there is slack enough from any cause to take up a tooch. At the same time, provision is made to secure the 6 in. of initial travel before brakes are applied and maintain it as long as the brakeshoes last; by this means the maximum power of the brake is realized and every car in the train gets its proportion of the air pressure. The dead levers need not be touched.

The "O. K." adjuster belongs to the class of single adjusters, that is, only one is needed to a car; the slack from both trucks is adjusted by it. Its construction is simple and strong and its motion is direct and positive. No part of its motion is derived from springs, but the work is performed by gravity. The pawls are made to embrace their respective parts so that they cannot be thrown off by shock. It is in successful operation upon several different roads and is said to have done work perfectly through the severest snowstorms of the past winter. It is manufactured by Messrs. Pratt & Letchworth, of Buffalo, N. Y.



The O. K. Brake Slack Adjuster.

A Great Wood-Working Machine Works.

For many years past the establishments of the J. A. Fay Company and of the Egan Company, both of Cincinnati, O., have been familiar not only to users of wood-working machinery, but to engineers generally, as works of the first rank in their line, and many hundreds of machines of different designs for turning, shaping, surfacing, cutting and polishing wood have been turned out by them. Every effort was made by each of the establishments to keep abreast of the requirements for improved machinery of this class, and a spirit of keen competition to turn out the best work was developed between them.

With the consolidation of the two works, which was effected a few months ago, the efforts of both have been united in one object, and the combined resources of these two large industrial plants are now second probably to none in the world. It is presumably safe to say that no other similar establishment anywhere can turn out more complete or more satisfactory equipments for car building, furniture and chair making, planing mills, building material manufacture, or any other branch of wood working. The truth of the claim that the combined plant is the largest of its kind in the world will, perhaps, be better appreciated when it is borne in mind that the Fay department has a floor area of 223,000 sq. ft., and the Egan department one of 218.000 sq. ft., making together a working area of about 11 acres, and giving employment to 1,500 skilled workmen.

The equipment embraces the best known appliances and the most modern machinery, and the most approved systems are followed. so that accuracy and superiority are secured in the output. Over one-half of all the wood-working machinery made in the United States is built at these works, and the machinery is well known in all parts of the world, and has been awarded many medals at different expositions. The "Grand Prix" of the Paris Exposition of 1889 and the decoration of the "Legion of Honor" are among the achievements of the company. Located as they have been for years, in close proximity to each other, the mechanical combination of the two establishments was easily effected, and united, as they now are, under one business management as well, they form an admirable representation of the legitimate outcome of manufacturing perseverance and excellence. Mr. Thomas P. Egan is the President of the consolidated companies.

The Electric Mine Railroad at Bleiberg, in Carinthia.*

At the lead mines of the Bleiberg Union, which cover a considerable extent of ground, the mineral from the different working places is brought to a main drawing-shaft, the Rudolph shaft, 121 metres deep, connected at the surfacewith thecentral dressing floor, along theadit-level in tubs containiug 560 kilogrammes, which, when pushed by hand for a distance of 900 metres, employed a force of twenty-one putters, making nineteen journeys in a shift, in order to supply the daily output of 224 tons. The working of the dressing floor being in some danger of interruption from the disinclination of the putters to work regularly during the season of active operations, which is confined to the nine months, April to December, inclusive, or two hundred and thirty-four days, it was determined to substitute mehanical for hand-traction in the adit, and, as there was 8 H. P. available at the dressing floor, it was determined to utilize it, partly for lighting and partly for hauling purposes. For the former purpose 30 incandescent and two arc lights have been provided, saving about £100 per annum upon the former cost for illumination; while for the second an electric railroad has been established in the adit, the whole being constructed by Messrs. Ganz & Co., of Buda-Pesth.

The railroad is different in many respects from those previously established in collieries and other mines with large and regular levels. Both shaft and adit are very wet, rendering special care necessary in the insulation, and the latter is crooked and so narrow that the dimensions of the locomotive are restricted in breadth to 700 millimetres, with a gauge of 430 millimetres, and a height of 1,700 millimetres from the top of the rails to the overhead conductors. The work, which is limited by the capacity of the winding engine of the shaft, consists in drawing 40 trains of five loaded tubs in the shift of 10 hours, with a mean speed of three metres per second, 11 kilometres per hour). The tub weighs 200 kilograms, the load 560 kilograms, and the engine 1,550 kilograms, giving a total weight per train of 5.350 kilograms, which on a level line with a traction coefficient of one per cent., requires a mechanical effort of 161 metre-kilograms, or 2.15 H. P., the corresponding electrical energy being 2.15 by 736, or 1,600 watts, or, allowing for resistance in the conductors and eight glow-lamps on the road, about 2,500 watts as the normal working current, which, however, is considerably exceeded at starting. The dynamo, of compound construction, is designed for a maximum of 6.000 watts at 700 revolutions per minute, giving a current of 220 ampères and 22 volts. The engine-house is 95 metres from the shaft; the current is conveyed to the latter by two six-millimetre copper wires, and thence down to the adit by a cable with two triply insulated wires covered with lead, which is laid in a waterproofed wooden case in the footway division of the shaft, so that it may be readily accessible. The line conductors are 6-millimetre wire, of silicon bronze, which are supported by insulators 330 millimetres apart and 1,700 millimetres above the rails. These insulators are roofed with sheet-zinc and connected by pieces of galvanized wire-rope to other bracket insulators fixed to the sides of the level. This arrangement gives a double insulation which is of some importance, as the rock. from its numerous lodes and cross courses, has a not inconsiderable conductivity. In order to divert the current at points of junction the insulated line carriers are mounted on a sliding frame, so that they can be shifted laterally from one to the other line. These points are marked by incandescent lights.

The locomotive, which is about 2.5 metres total length, bas two axles, one metre apart, carries a motor with a Hefner-Alteneck armature and 46-part commutator, making the same number of revolutions, 700, as the primary dynamo, which is reduced by a screw and worm-wheel to 88 revolutions on the driving-shaft, and to 34 revolutions on the front driving-axle, by chain gearing, in order to obtain the required speed of three metres per second. The driving-axle is coupled to the hinder one by a similar chain, the total adhesion weight of the engine being required for the full train of five vehicles. When only the front axle is driving, the load must be reduced to three.

The current is taken and returned by a pair of curved tubular arms, forming spring poles, with insulated iron plates at their ends upon spring carriers, which maintain a sliding contact with the line wires. The latter have been made of silicon bronze, in preference to copper, in order to resist abrasion by the rubbing of the contact plates.

The results of the trials show the insulation to be very perfect, the loss of tension being less than was expected. The total current used, as measured at the generating dynamo, varied between 8 and 16 ampères, the meter rising to 35 ampères at the moment of starting, while in smooth running it oscillates between 8 and 12 ampères. The average energy required for working the line and the lighting of the road and the engine, including all losses in the conductor and magnetic friction, is 220 × 10 = 2,200 volt ampères, or 3 H. P., and as the motor does 2.15 H. P. work, the efficiency is 70 per cent.

The installation, costing £1.300, does the work of 21 putters in the level, their place being now taken by 16 fillers, at lower wages, the total saving being given at from £352 to £400 per annum. The advantage of lighting up the crossing points of the branch-levels and the shaft-bottom, which is done by pairs of 16-candle glow-lamps, is also found to be of great advantage to the miners.

*From "Abstracts of Papers" Institution of Civil Engineers.

Prince Edward Island Tunnel.

It is expected that the borings in connection with the survey for the proposed tunnel between New Brunswick and Prince Edward Island will be continued about July 1. Of the 29 holes to be bored to complete the survey, 10 are finished, and as the machinery is all on the ground it is expected that the remaining 19 will soon be completed. Mr. Hendry, the Government Engineer, will superintendent the boring. Of the $12,000 appropriated, $6,000 has already been expended, and it is expected the balance will complete the work.

Elastic Tie-Plates for Metal Cross-Ties.

In a communication on the use of elastic tie-plates in connection with metal cross-ties, Mr. J. Schuler points out, in *Glaser's Annalen*, that experience has shown wooden ties to require less frequent tamping, and to become more firmly bedded in the ballast than iron or steel ties. This advantage, he thinks, is not due alone, as is generally supposed, to the greater width of bearing surface, and greater thickness of the wooden tie, but almost wholly to its elasticity, which modifies the shocks of the rolling stock passing over the rails, tends to prevent the loosening of rail fastenings, and helps generally to preserve the rails, ties, and the roadbed. If, therefore, a tie-plate having a greater degree of elasticity than a wooden tie be interposed between a rail and a metal tie, it is fair to presume that even better results will be secured than by having a rail resting simply on a wooden tie. One of the points of superiority of the elastic tie-plate and metal tie combination is to be found in the circumstance that the re-action force of a rail passing quickly from a loaded to an unloaded state is largely counteracted by the spring-action of the tie-plate, a point which increases in importance with higher rates of train speeds. This counter-balancing action, as it may be termed, of the tie-plate serves to maintain an undisturbed portion of the cross-tie in the road-bed. Whether these points will be borne out practically will be shown, more or less conclusively, by the results which will be obtained on the Friedrich Franz railroad in Mecklenburg, and on some of the divisions of the Prussian state railroads, on which the elastic tie-plates are shortly to be introduced.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday.
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

A number of the commercial exchanges of New Orleans have agreed to establish a freight bureau, and it is said that the necessary funds for its support have been pledged. These establishments have now become so numerous that their value to the merchants of a city must be well-nigh self evident. It is pleasant to notice that in the present announcement there is nothing said about any alleged hardship and injustice that other cities are inflicting upon New Orleans by inducing the railroads to favor them at her expense. This undertaking is evidently based on the legitimate theory that the magnitude of the interests involved warrants the employment of a commissioner, without regard to whether there is or is not any great grievance against the railroads. Such an officer is needed to prevent the inception of grievances and to cure small causes of friction. If the value of the work done by these functionaries in Kansas City, Cincinnati, Philadelphia and other cities could be measured in money—the value to each line of business or to each large concern, we mean—we should probably see the establishment of bureaus in a good many more cities; for the cost per unit of business is exceedingly small.

The telegraph operators on the Chicago & Northwestern struck one morning last week, large numbers of them leaving their work. After a few hours it appeared that the alleged order from the brotherhood officer was counterfeit, and that no strike was really ordered; and most of the men went back to work. But on the Peninsular division the operators did not get along so smoothly, and a press dispatch from Negaunee reports that 50 of them, mostly agents at small stations, were discharged. They applied for reinstatement, but the superintendent did not want their services. We do not know how accurately this dispatch represents the facts, but if it is not true it ought to be—as far as the rights of the operators are concerned. The superintendent of the Peninsular division evidently treats the behavior of these agents as an unpardonable offense, and we think he is right. A scheme among fifty or a hundred men for leaving work simultaneously is a serious affair, and nothing but absolute justness of the cause warrants any one in putting it into effect. Officers who arrange a code of terms for communicating to the rank and file, and leave the door open for easy forgery are not fit for their places, and members who acquiesce in such arrangements and go so far as to leave their jobs on the strength of them do not deserve many of the "rights" which strikers usually demand. It will, doubtless, be remembered that this is not the first time that exactly this thing has happened to the same organization. Last October 2,000 operators went out on the Atchison, stopping the freight business of the road for 12 hours, on a forged order. Apparently these telegraphers are great fools or there are some great liars among them.

New York to Chicago in 20 Hours.

The reduction of the running time to 20 hours between New York and Chicago is a great feat in railroad operation and an important public event; the first because of the high speed sustained over a great distance: the second because now it has become possible to do a fair day's business in New York one day, in Chicago the next and in New York again on the third. For instance, the writer of the account on another page went from New York to Chicago and back in 44 hours and 15 minutes, traveling 1,928 miles in that time, and had three and one-half hours at the western end for business, allowing half an hour for getting to and from the station and for "lost motion" in ceremonies and courtesies, which seems to be ample in Chicago. When the running time between New York and Chicago was reduced to 25 hours, a considerable saving was made in the sum of the discomforts of the human race, but the man in New York who had but one day's business in Chicago still had to give three working days to it, however he might select his trains. Now he can get several good working hours out of three consecutive days in each city. Or if he wants more time in Chicago he can leave New York at 3 p. m., get to Chicago at 10 the next morning and instead of returning by the "Flyer" at 2 that afternoon he can take one of the limited trains back at 5 p. m., and still he will have saved the best part of one business day. Those who think we work too hard may consider that the gain is doubtful, but to most of us the time spent on a railroad train is not only lost, but tiresome and disagreeable, and time saved is time gained.

If this quickened time is a gain, we owe it to the New York Central and the Lake Shore. When the New York-Chicago time was reduced to 26 hours and 45 minutes in October, 1881, the Pennsylvania led and was very reluctantly followed by the New York Central in December of that year. This last advance is made by the New York Central and has been resisted by the Pennsylvania, which has not yet indicated its intention to follow. Our own position in the matter has been that this quickened time should not be attempted now for two reasons: First we have thought that it is bad railroad economics to make any unnecessary disturbance in the transportation department or the traffic department this year, because it will be hard enough to move the large traffic and to maintain rates, without introducing any unnecessary complications. Second, we have thought that it would be more prudent not to attempt any great increase of speeds until the lines are thoroughly block-signaled. Perhaps both of these objections may be considered by the railroad men as "academic," but it is our business to be academic, and we know that there are a good many men in actual railroad management who think our position practical. However, the step is taken, and we sincerely hope that neither rate troubles nor accidents may come in to prove that it was not a wise and timely one. Certainly it is an epoch in the history of railroading.

We have said that the establishment of this service is a great feat in railroad operation. In fact, nothing approaching it has ever been attempted. The high tide of fast long distance running on the other side of the Atlantic was reached in the famous runs of the East Coast and the West Coast lines, from London to Edinburgh, in the summer of 1888. Those trains touched a maximum of 52.7 miles an hour, including stops, for a distance of 392.5 miles. This was for but one run, however, and then the rate dropped down to 50.67 miles for the East Coast route. Those trains weighed about 180,000 lbs. without engine and tender, as compared with, say, 400,000 lbs., or 495,000 including the dining car, for the new "Exposition Flyer," and the "diner" is run about 806 miles in the round trip 1,928 miles. On this continent the fastest long distance trains have lately been the New York and Chicago, 24 h. 45 min., limited trains, of the Pennsylvania and the New York Central and their Western allies. These are very heavy trains, weighing over 500,000 lbs. without the engines. The speed of these trains, including stops, is below 37 miles an hour for the Pennsylvania (912 miles), and 39 miles an hour for the New York Central and Lake Shore.

In 1891 the New York Central established the Empire State express, a service which has become famous not only as the fastest long-distance in the world, but as having developed much the fastest single miles ever recorded. The performances of this train are so recent that it can hardly be necessary to relate them again. They include regular summer and winter runs of 439.6 miles at 50.7 miles an hour including stops; a record of 116 miles at 63.38 miles an hour; a record of 51.67 miles at 67.38 miles an hour; one of 145.6 miles at 61.96 miles an hour, and a single mile in 35 seconds.

All of these records had prepared us for the "Exposition Flyer" on the New York Central. That road will merely have to repeat what it has been doing for many months. The question was as to the fitness of the Lake Shore to take and keep the pace; for this is not only a matter of machinery, it involves the training of experience in handling such trains. Now we know that it can go the pace; and the chances are that it can hold it, although the engines are considerably smaller than those of the Central. On the other hand the grades are lighter and the speed is lower; and after all, fast trains are no new thing on the Lake Shore.

One who makes the trip to Chicago and back must be struck by the fine schooling in "smartness" that such a train gives for all hands. The shifting of engines, inspection of running gear, loading of baggage and all other details of the service must be carried out with the greatest promptness; and the handling of the trains in all particulars showed fine efficiency. Altogether the first round trip was a remarkably smooth and skillful performance.

The Lafayette Accident.

From all that can be learned up to the present time of the circumstances surrounding the accident to the train of the Cleveland, Cincinnati, Chicago & St. Louis road at Lafayette, Ind., on the morning of May 7, in which both the engineer and fireman were killed, it is probable that the real cause of this accident will never be definitely ascertained. A number of theories have been advanced and we can only discuss these theories in the light of such facts as have been brought out by investigation. A brief statement of the important conditions that are known is printed on the third page of this issue. The essential and unquestionable facts are as follows:

From the time of leaving Chicago up to and including the last stop at Templeton, the air brakes were in a perfectly satisfactory working condition; no call for the application of hand brakes was made by the engineer until he was well over the summit of the grade, when both the conductor and baggageman claim to have opened conductor's valves. An hour and a half after the accident, air brakes on the three rear cars were found applied with sufficient force to prevent their being moved by a heavy freight locomotive. From this it appears that the brakes were in good working order, and that there was an abundance of air stored throughout the train to supply the brakes. Had the brakes upon the forward cars been found applied after the accident, but no air found in the rear cars, it might have been a fair presumption that the air supply had been cut off from the rear portion of the train, but the brakes upon the rear cars being found strongly applied so long after there was any opportunity for them to have been charged with air, is practically conclusive evidence that, at the time of derailment, the brakes throughout the whole train were abundantly supplied with the means of application.

As the grade is three miles long, averaging 70 ft. per mile, the attempt to bring the train under control should have been made long before coming within half a mile of the foot of the grade, especially if the train were attaining unusual speed. It is fair to assume that the "lurch" felt by the conductor was due to the application of the brakes. If the brakes had thus been applied and the conductor and baggageman subsequently responded to the call for brakes by opening their conductor's valves, there would, of course, be no response by the application of the brakes, as they were already applied. In this view of the case, and especially in view of the statements concerning the very high speed of the train, it would appear quite evident that the engineer, through being asleep, or from an almost unsupposable lack of good judgment, permitted the train to get wholly beyond his control before applying the brakes; then, when he realized that, having applied the brakes, the train was still beyond his control, he hastily called for hand brakes. This would appear to be the most reasonable solution of the cause of the accident.

There is but one other theory which can be considered tenable. It is possible that, about the time of reaching the gravel pit, half a mile from the foot of the grade, the engineer attempted to apply the brakes and was partially successful; that is to say, the brakes of the locomotive and tender, and possibly upon the

two mail cars, were applied. The train not being checked as the engineer would expect, he applied the brakes with greater force; finding that the speed of the train was still not properly checked, he signaled for the application of hand brakes. Thereupon, both the conductor and baggageman attempted to open the conductor's brake valves in their respective cars. The handles of these valves not being properly connected to a cord running through the car, and the use of the conductor's valve being of rare occurrence, both the baggageman and the conductor, in their confusion, failed to properly open the valves. This view of the case involves the supposition that, when the engineer applied the brakes they did not apply throughout the whole train. Such a condition could be accounted for in but two ways: either the train brake pipe became obstructed by some foreign substance in its interior, or one of the train pipe cocks at the end of a car was closed. At least one case is known where there was an obstruction in the train pipe. A lead car seal was found in the brake pipe, where it had presumably been placed by some thoughtless person, and was located in such a manner that the passage of air through the train pipe had not been seriously obstructed until the lead seal took a position such that, when the air rushed rapidly through the train pipe. the seal was turned up on edge in front of a cock and almost wholly closed the aperture. Such an obstruction was possible in the case at Lafayette, but seems less likely than that a train-pipe cock was closed. Had the train been fully equipped throughout with the quick-action air brake apparatus, in which the cocks at the ends of the cars are of such a design that it is a practical impossibility for one of them to be closed by flying ballast or other missiles, it would be hard to conjecture how a cock could have been closed, unless maliciously. It has been suggested in this case that a cock may have been closed by tramps, who were stealing a passage, but there appears to be no direct evidence to support this suggestion. The second car of the train, however, is known to have been equipped with the old style automatic air brake, and the train pipe cocks at the ends of this car were of such construction that the cock at the rear end of the car might have been closed by a flying cobblestone (such as were found in abundance along the track at the gravel pit). Such occurrences, while not numerous, have in the past been so well authenticated that, in the quick-action air brake, this form of train-pipe cock has been replaced by one which rendered such an occurrence practically impossible.

If it be taken for granted that the train-pipe cock at the rear end of the second car was closed by some flying object as it passed the gravel pit, what subsequently happened might be accounted for in this wise: When the engineer applied the brakes they applied to the locomotive drivers and the wheels of the tender and two mail cars. The application of the brake to the locomotive and forward cars produced a shock through the train, which was observed by the conductor. The first application of the brakes not checking the train properly, the engineer, further on, applied them with greater force, and then, finding that he had not checked the train, signaled for hand brakes. The attempts of the conductor and baggageman to apply the brakes upon the train by means of the conductor's valves must then have been ineffectual, and the train passed on to its destruction. The brakes upon the rear portion of the train would thus not have been applied until the first three cars had broken away from the balance of the train at the time of the wreck, thereby liberating the air from the train-pipe and leaving the brakes applied upon the rear portion of the train, as they were subsequently found.

There were two features in the brake apparatus of this train which deserve comment. The first was the brake apparatus which was in use upon the second postal car with six-wheeled trucks. The trucks were not only not supplied with brakes upon all the wheels, but the brake apparatus upon the car was of the old automatic form and had train-pipe cocks at the ends of the car which were liable to be closed by flying objects when the car was in motion. This danger is a remote one, but it *is* a danger. The other feature was the lack of a cord attached to the conductor's valve and running throughout the length of the car. There are a great many passenger cars in this country in which the handle of the conductor's valve is not supplied with a cord running throughout the car; but the universality of the practice does not make it a good one. Had the handles of the conductor's valves in the cars of this train been properly connected with a cord running throughout the car, there could have been no uncertainty in the mind of the conductor or the baggageman as to the direction in which the handle must be moved to apply the brakes, nor as to how far such movement must be made. A strong pull upon the cord would have ensured the application of all the brakes back of the point at which the train-pipe cock was closed. The conductor's valve, as before stated, is but seldom called into requisition; but, if it is worth having at all, it is certainly equally important that it be so connected up that its operation will be sure when the necessity arises. Those who advocate the non-use of the cord base their opinion on the liability of trains being stopped unnecessarily by ignorant or mischievous passengers, and the danger of such stops is enlarged upon; but is it not high time that we abandoned the theory that it is dangerous for a train to stand still? That theory is a part of the ancient plan of trusting partly to luck for the safety of trains, and that plan ought to be out of date everywhere by this time.

It will be seen that to render our second theory acceptable, it must be admitted that, first, the engineer applied his brakes at too late a period in descending the grade; second, the very unlikely closing of the train-pipe cock of the second car by a flying missile must have occurred; and, third, the two separate attempts of trainmen to open conductor's valves must have been unsuccessful. Most people will doubtless deem it more difficult to accept the occurrence of all these circumstances than to accept the theory first mentioned; that the engineer, being asleep, or through a temporary aberration of mind, permitted the train to attain such a high speed upon the descending grade before applying his brakes that the train could not be brought sufficiently under control before reaching the remarkably sharp curve at Lafayette Station to prevent derailment and disaster. If we assume that most or all the employés on the train were asleep, or dozing, and that the speed became dangerous, and the whistle was blown, further up the grade than our report indicates, the first theory becomes still more plausible; for it would be very easy for a train approaching such a grade at 30 miles an hour to attain, in two miles, a speed which it would be impossible, in the remaining mile, to reduce below 30 miles an hour.

The failure to stop the train by the hand brakes is involved in about as much uncertainty as is the air-brake question. A curve of 388 ft. radius in the main track is a dangerous place and should be approached with as much caution as a grade crossing, a drawbridge or a headhouse. The English Board of Trade inspectors, as is well known, insist that trains shall habitually be controlled by the hand brakes in running into a headhouse. On the Boston & Albany, trains approaching grade crossings are slackened by the brakemen, who keep the brakes set until the engineman signals to have them released. All roads, presumably, require the brakemen to be at their posts on approaching a place where it is known that a failure to stop will surely be dangerous. Some precaution certainly ought to be taken in approaching a place like Lafayette, but there seems to be no doubt that in this case the brakeman failed to carry out even the least stringent of these three rules.

Most roads in this country, at least in the West, where the number of cars, in proportion to the number of passengers, is larger than in New England and he Middle States, run passenger trains with too few brakemen. They did this before the days of air brakes. The open country, giving a chance to see danger a long way off, offered peculiar encouragement to such practice, and on the advent of the power brake it was the most natural thing in the world to conclude that the running of long trains with only one brakeman was perfectly safe. We understand that this Big Four train ordinarily has only one brakeman. But it needs no argument to prove that with the speeds now in vogue, and the heavy cars, dependence upon hand brakes is practically worthless in an emergency unless there is a man to every two cars and all the men are vigilant. And when we come to consider vestibule cars we find that the value of our dependence upon brakemen has still further vanished, because the brake-wheel is in an inconvenient position and has to be turned many more times to produce the same effect at the brake-shoes.

If it be held that the danger from the absence of brakemen is too small, and the cost of extra men too great, to substantiate the foregoing argument—as, indeed, nearly all railroad officers do hold, if we may judge by their practice—then why not look to the better discipline of the men already employed on the train? On this train there were, doubtless, two or more porters, a sleeping car conductor, several mail agents and very likely a peddler. In old times these quasi-trainmen knew the road and knew something about handling a train; now in most cases they are only passengers. It would require a radical change to make this class of any use as "safety appliances" now; but if we do not use them, and if we continue to employ the smallest possible force of brakemen, let us squarely acknowledge that we depend upon the power brake and that alone.

The Westinghouse brake is certainly one of the most reliable mechanical devices used in the railroad service; but even if we treat it as infallible we still have one personal factor to deal with—the fallibility of the engineer—and we are not dealing with a mere theorist's fancy, therefore, when we discuss the necessity of vigilance on that part of the train back of the tender. Even a very remote danger justifies *some* attention to this requirement, and the officer who examines the crew of this train on the Big Four can probably make some very practical suggestions concerning it. Where was the rear brakeman? Did he not know the road well enough to discern the danger? Or was it customary for trains to run 50 miles an hour until they reached the very beginning of this sharp curve? Why should not the rear brakeman have his hand on the brake valve when approaching such a place? We can all ridicule this as super-refinement of caution, but experience with one or two disasters like Lafayette would clarify our views a bit. Were the sleeping car men all asleep? Why should not a railroad company take an interest in these men, possibly paying them a little something? Here, again, a little experience greatly brightens one's thoughts. It is true that a train of cars can be handled a million times in perfect safety by the engineman alone; and to educate men to vigilance in a duty which is worthless except one time in a million (or a number of millions) looks like a waste of energy; but, as before intimated, the conductor's valve is good for nothing if it is not used at the right time, and when neglect does finally bring on a disaster, the training, which, if it had been put in force, might have proved a preventive, looks like a very small matter compared with the damage done; and it is to be remembered that the training which fits a man to make the best possible use of the conductor's valve at the same time educates him to utilize the hand brakes to the utmost, in case of necessity.

April Accidents.

Our record of train accidents in April, given in this number, includes 72 collisions, 92 derailments and 9 other accidents, a total of 173 accidents, in which 35 persons were killed and 122 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But-ting.	Crossing and other.	Tot'l.
Trains breaking in two	10	0	0	10
Misplaced switch	2	0	1	3
Failure to give or observe signal	3	2	0	5
Mistake in giving or understanding orders	0	4	0	4
Miscellaneous	7	3	5	15
Unexplained	4	16	15	35
Total	26	25	21	72

DERAILMENTS:			
Broken rail	3	Bad switching	2
Loose or spread rail	3	Track repairers	1
Defective bridge	1	Derailing switch	1
Defective switch	5	Open draw	2
Defective frog	1	Animals on track	4
Broken wheel	3	Washout	3
Broken axle	6	Maliciously misplac'd sw'ch	3
Broken truck	1	Malicious obstruction	3
Fallen brakebeam	2	Accidental obstruction	11
Broken car	1	Unexplained	26
Broken drawbar	2		
Misplaced switch	8		92

OTHER ACCIDENTS:	
Boiler explosion	4
Broken side rod	1
Cars burned while running	1
Other causes	3
	9
Total number of accidents	173

A general classification shows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.	P.c.
Defects of road	0	13	0	13	8
Defects of equipment	10	15	5	30	18
Negligence in operating	27	14	1	42	24
Unforeseen obstructions	0	24	2	26	15
Unexplained	35	26	1	62	35
Total	72	92	9	173	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.
Passenger	26	26	6	58
Freight and other	111	67	3	181
Total	137	93	9	239

The casualties may be divided as follows:

KILLED:	Collisions.	Derailments.	Other accidents.	Total.
Employés	15	10	8	33
Passengers	0	2	0	2
Others	0	0	0	0
Total	15	12	8	35
INJURED:				
Employés	55	34	4	93
Passengers	8	11	4	23
Others	6	0	0	6
Total	69	45	8	122

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	0	6	2	7
Defects of equipment	0	0	9	6
Negligence in operating	1	9	16	60
Unforeseen obstructions and maliciousness	1	7	3	14
Unexplained	0	1	3	6
Total	2	23	33	93

Twenty-five accidents caused the death of one or more persons each, and 45 caused injury, but not death, leaving 103 (60 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with April of the previous five years shows:

	1893.	1892.	1891.	1890.	1889.	1888.
Collisions	72	47	67	64	36	49
Derailments	92	86	108	67	52	83
Other accidents	9	10	6	4	5	4
Total "	173	143	181	135	93	136
Employés killed	33	30	52	13	22	33
Others "	2	9	4	2	23	9
Employés injured	93	107	100	81	60	107
Others "	29	31	49	59	26	84
Passenger trains involved	58	45	53	45	43	46
Average per day:						
Accidents	5.77	4.77	6.03	4.50	3.10	4.53
Killed	1.17	1.30	1.87	0.50	1.50	1.40
Injured	4.07	4.60	4.97	4.67	2.77	6.20
Average per accident:						
Killed	0.202	0.272	0.309	0.111	0.483	0.308
Injured	0.705	0.972	0.823	1.037	0.924	0.368

The record for April is a very moderate one, speaking comparatively. Only two passengers were killed; one of these was in a freight train, and in the other case the train was being pushed ahead of an engine, a method which in many cases invites disaster. Only 23 passengers were injured, a number much smaller than has been reported for many months, and only about one fifth the average for the past year. As the number of passengers killed in March was only four, the record of casualties to passengers may be regarded as having been favorable for two months.

A list of 173 train accidents can never be called unimportant, however, and the mildest monthly record that we ever printed contains a long story of disaster and death; and the present record is by no means lacking in this respect. The worst accident of the month was the butting collision at Glen Carbon, Ill., on the 3d, where five persons were killed. The *Travelers' Record* refers to this case as due to an "old and familiar cause," and it must be admitted that this characterization is correct. Cases where both conductor and engineman forget their orders, and at the same time forget to carry out the very simple rule intended to provide against forgetfulness, constitute one of the most disgraceful features of railroad service. We have mentioned this more than once before. The rule requiring conductors and enginemen to check each other is one of the most universally approved and most universally unenforced in the whole railroad code. This state of affairs is one of the things giving the greatest force to arguments in favor of the adoption of the block system on both single and double track lines. The drawbridge disaster at Palatka, Fla., on the 4th, where was killed one of the two passengers in this month's death record, appears to have been due to the grossest carelessness; but the men most responsible were killed.

It will be noticed that in two passenger train wrecks the presence of Pullman vestibules was regarded as an important element of safety. Collisions occasioned by cars being blown out of side tracks by unusually high winds were reported at four different places in April, and these four collisions caused the death of one and the injury of four employés. Accidents from this cause happen nearly every month in the year, but we seldom hear of many at a time or of many in any one locality, so that the danger is probably not appreciated as thoroughly as it ought to be. It is regrettable to see this kind of negligence continue, especially in view of the fact that a derailing switch at the lower end of each side track is such a cheap and simple safeguard.

On a quarry railroad at Somerset, Pa., April 25, seven persons, mostly passengers, were killed by the wreck of a runaway train, the road being very steep and the unmanageable train dashing into some freight cars at the foot of the grade. It appears that this road does not make a regular business of carrying passengers, and there were no passenger cars on this train. At West Bay City, Mich., April 6, a train of the Cincinnati, Saginaw & Mackinaw struck an electric street car, badly injuring seven passengers. It is said that the motor man was inexperienced and careless. In St. Louis, April 10, eight persons were badly injured by a collision of electric street cars. In Chicago, April 14, there was a bad collision of cable cars, as heretofore noted in the *Railroad Gazette*. At Jackson, Ind. on the 22d, a passenger train of the New York, Chicago & St. Louis killed five persons—a whole family—at a single stroke, the engine striking a wagon in which they were riding. A press dispatch from Albuquerque, N. M., April 21, reported that an express car had been burned on the Atlantic & Pacific, and that it contained about $50,000 in money. Half of this was in paper and was burned up and the other half was gold, which was mostly melted. It does not appear whether the car was running at the time, or how closely the reporter confined himself to facts.

The much-needed new passenger station for the Boston & Maine Railroad in Boston must still wait an indefinite time for materialization, the legislature having rejected the bill to compel its early construction. We have not been able to follow the fortunes of this bill in detail, but in general its object was good, and every year's delay in the matter is cause for serious regret. The Boston & Maine is now building a station and yard which will accommodate the business for a few years (and including accommodations for the Fitchburg road, whose interests constitute one of the bones of contention connected with the project before the legislature); but the toughest part of the problem, the raising of the drawbridge over the Charles River, and the abolition of numerous grade crossings north of that river, is not touched by this improvement, and the main question remains just as pressing as ever. Whatever the motive of the railroad officers in opposing the proposed legislation the change is inevitable, and it seems unfortunate that such a costly task is being made still more costly. The state will probably never be more willing to bear a part of the cost than it is now. The magnitude of the questions involved in the establishment of a great railroad terminal in a large city seem to be appreciated only here and there, even among the men most interested, so that it is probably not to be wondered at that this question has not been decided on its merits. Some phases of the matter are brought out by the Boston *Herald* as follows:

The vote of the Senate on the north union station project is not surprising. The influences that were brought to bear in opposition were of a quality and quantity which made themselves irresistible. The proposed change was advocated, first, by the rapid transit commission; second, by the railroad commission; third, by the Associated Board of Trade of Boston; and fourth, by the rapid transit committee. But none of these had that personal interest in the subject that would authorize them to enter into an active lobbying campaign to push the matter through, a description which hardly holds good of the interests and methods of the railroad companies that were opposing the project. Under these circumstances it is not at all strange that the senators had only one side of the matter dinned into their ears. But the effect of this vote and of other similar proceedings is simply encouraging the belief in the minds of the people throughout the state of Massachusetts that the state must possess itself of the railroad interests. This is a tremendous and a radical change; but the railroad companies themselves are hurrying this change forward in a manner which to our mind seems blind and foolish in the extreme.

Recent writers have made the prediction that socialism will soon have a stronger place in the affairs of Massachusetts than in those of any other state. Perhaps the railroads are helping it on.

The fare between New York and Chicago by the 20-hour train is $26 (with a berth $31), and this is understood to be the formal award of the arbitrators, Messrs. Bliss and Cassatt, though their report has not been given to the public. This indicates a considerable moderation of the Pennsylvania's original demand (which was approved by Messrs. Walker, Goddard and Blanchard), but it is questionable if the train could have been filled at $30 (besides the berth), for at $26 the trains still run rather light, although with profitable loads We are inclined to believe, however, that considering the saving of one meal as well as the saving of time the train will be a popular one at the fare fixed—for this summer at least.

The new vestibule train of the East Tennessee, Virginia & Georgia, to run between Atlanta and Chicago, will run, north of Cincinnati, over the Cleveland, Cincinnati, Chicago & St. Louis, and with this time table the Big Four will have five through trains a day between Cincinnati and Chicago, one of them being the Fast Flying Virginian. Evidently the confidence of the railroads that there will be a large movement of people to the World's Fair has not been shaken by the determined way in which people have remained at home until the Fair should be somewhere near complete.

NEW PUBLICATIONS.

Knots, Splices, Hitches, Bends and Lashings; illustrated and described. By F. R. Brainard, Ensign U. S. Navy. 4 in. × 6 in., 76 pages of text and 19 of advertisements. New York: Practical Publishing Co. Price, $1.

Ensign Brainard describes with illustrations right and left handed ropes, etc., with knots and splices, and also shear leg lashings. There are also tables giving weight and strength of hemp and wire rope. The illustrations, though rude, are good enough, with the aid of the text, to show any one how to make the knots or lashings described. Considering the price of the book, however, it would have been well to have described lashings for a triangle, and the tables might have covered manila and sisal ropes.

TRADE CATALOGUES.

Frogs, Switches and Crossings. Catalogue No. 3 of the Weir Frog Co., Cincinnati, O.

Although the catalogue of the Weir Frog Co. is well known to our readers this one shows some new things. For instance, the company has adopted a half-inch steel base plate under the point of the standard stiff frog. It is riveted to the wing rails and spiked to the ties, which prevents the point cutting into the ties and increases the life of the frog. Improvements are shown in spring rail frogs. One of these is a hinged movable-wing rail, the purpose of which is to disconnect the movable-wing rail from the main track, so that it will not be affected by the creep of the track. With this frog also it has been the purpose to secure safety if the movable-wing rail is broken; to provide a frog which will not allow the wheels to drop into the throat when the wing rail is not in place, and to provide a wing rail which will not be forced open by wheels with worn treads. Another new feature in the catalogue is a combination crossing with movable frog points operated by two stands. These can also be thrown by the Weir single lever stand if desired. Another improvement is a re-enforced switch rail for spilt switches with an adjustable head rod. Each rail is strengthened by having two pieces of wrought iron riveted on a web and running back to about 1½ in. from the heel of the switch rail. The adjustable head rod is provided with a turn buckle, which is kept below the level of the top of the ties. The catalogue shows a number of other improvements, and the rules and tables for laying out turnouts and crossovers have been considerably amplified; other useful tables are added.

Baldwin Locomotive Works.—The Baldwin Locomotive Works have issued a very handsome description of their exhibit at the World's Columbian Exposition. It is a thin quarto volume of 78 pages illustrated by direct reproductions from photographs. The frontispiece shows the interior of the erecting shop and there are a general view of the office and shops and a line drawing of the "Old Ironsides," built in 1832, by Matthias W. Baldwin, a full size model of which is shown in the Baltimore & Ohio Railroad Co.'s exhibit of historical engines. A preface gives a brief history of the works, with statistics. It appears that up to May 1, 1893, the works had turned out 13,420 locomotives. In the first 30 years 1,000 engines were built, and almost as many were built in the single year of 1890. The bulk of the book is taken up with pictures of the engines exhibited at the World's Fair and full statistical information as to their weights, dimensions, fixtures and material; and the volume is not merely one of passing and curious interest, but will be a permanent book of reference. In all 14 engines are shown and 15 described.

Catalogue of the Berlin Iron Bridge Company.—A new catalogue of the Berlin Iron Bridge Company, of East Berlin, Conn., has just appeared. It is a pamphlet of 318 large pages, profusely illustrated. In it are shown many examples of the buildings, roof trusses and bridges constructed by this enterprising concern, together with examples of such specialties as corrugated iron doors and shutters and corrugated roofing. It has become an important part of this company's business to design as well as construct buildings for manufacturing plants of all kinds, and the company constantly employs a staff of engineers and architects and furnishes complete drawings for shops, mills, power-houses, carsheds, etc., and furnishes also superintendents for their construction. Some of the largest manufacturing plants in the United States have been designed and built by this concern, and the catalogue gives many interesting views of such plants.

Machinery, Metals, Hardware, Tools and Supplies.—Illustrated catalogue of Patterson, Gottfried & Hunter, Limited. New York City.

A handsome quarto volume of 512 pages with an alphabetical index of 20 pages is devoted to the articles dealt in by this house. These include not only an immense variety of shelf hardware, but fine tools from different makers, particularly tools for metal working, portable forges, drills, milling machines, lubricators of various sorts, gauges, pipe and pipe fitting and so on through, as we have said, 512 pages. It would be quite impossible to give an adequate notion of the contents of this fine catalogue.

Portable Forges, Blowers, etc. Illustrated catalogue of the Foos Manufacturing Co., Springfield, O.

This little pamphlet shows the Cyclone portable forge in various sizes and styles, also hand blowers, Cyclone portable press and the Cyclone kit of tools for machinists, etc. The same house issues a World's Fair edition of its annual catalogue, which is devoted especially to agricultural machinery.

Locomotive No. 999.—A Correction.

In an editorial note last week we said that the New York Central & Hudson River locomotive No. 999, was built by the Schenectady Locomotive Works. By what mental lapse this statement was allowed to get into the *Railroad Gazette* will always be unexplained. As a matter of fact, it was built at the West Albany shops of the New York Central & Hudson River Railroad Co., as we have repeatedly said in these columns.

Grain Elevators at Galatz and Braila.*

The extensive grain elevators and stores erected by the Roumanian Government at Galatz and Braila, on the Danube, at a cost of £850,000, are the first works of the kind carried out at the public expense by any European state. The output of grain (chiefly maize, oats, barley

* From "Abstracts of Papers," Institution of Civil Engineers.

and rye) had increased from 1,324,000 tons in 1880 to 1,952,000 tons in 1888. About half this quantity is exported by the Sulina mouth of the Danube, the process of transhipment from the railroad or storehouses to seagoing vessels taking formerly from three to four days. The ports on the Black Sea coast are not yet developed, though the railroad from Cernavoda to Constanza is in course of construction.

The works at both Galatz and Braila are carried out on the same type. The site is on soft ground, on the northern bank of the Danube, necessitating heavy foundations. The dock basin is 1,640 ft. long and 394 ft. wide, and has, at low water, a depth of 16 ft. 6 in., sufficient for all vessels passing Sulina. The works, as planned, comprise two large store buildings, each 394 ft. × 92 ft., 59 ft. 6 in. in height and 115 ft. back from the quay. At present one building only has been erected, but all provisions are made in working arrangements for the completion of the acheme. The building is entirely occupied by the siloes or hopper shafts, which are hexagonal in plan and constructed of iron framing with wirework filled in with cement. About three-fourths of the shafts are 11 ft. 6 in. in diameter, the remainder being 8 ft. 3 in.; the height of the shafts is 55 ft. 9 in. above the crown of the basement tunnels. Four towers at the angles of the building accomodate the elevators and gearing for all the machinery required. The building site is covered by 5 ft. of concrete, at a depth of 23 ft., resting on 5,000 piles. The basement sonsists of 9 parallel tunnels, corresponding to the rows of shafts above, and these are framed in 3 rows of hoppers, which discharge over as many automatic conveyors or endless traveling bands. The same system of distribution feeds the shafts above. At each end of the building a transverse tunnel connects with a longitudinal tunnel, 8 ft. 3 in. wide and about 9 ft. in height, running along the back of the quay wall, and again connected with a number of wells or shafts about 20 ft. deep. All connections are duplicated, so that both upper and lower bands, traveling in opposite directions, are utilized. The grain can thus be passed from a car by the elevators to any shaft, thence by the basement tunnels to either end of the building, and by the transverse tunnels to the quay-tunnel and to any of the wells. From these it can be lifted by telescope elevators and discharged into the hold of any vessel. The reverse operation can proceed simultaneously; *i. e.*, from any vessel along the quay to any portion of the building, or to the cleansing machinery, or from these back to the hoppers. The loading and unloading on the quay is effected by two traveling elevators. One of these, running on a gauge of 11 ft. 6 in., and mounted on a turn-table, has a long overhead gallery, in which run automatic conveyors; from one end hangs a telescope tube with bucket elevator, which can be lowered either into the vessel's hold or into the wells supplied by the longitudinal tunnel; the other end carries a tubular shoot for delivery to either vessel or wagon or well. The capacity of the elevator is 150 tons per hour; the platform carries a 35-H. P. engine (of marine type), with vertical boilers, feed-tanks, windlass, etc., the whole being inclosed in framing covered with corrugated iron. A second elevator, of similar capacity and engine power, but not provided with rotary movement, has a vertical elevator for taking grain from the wells, and an adjustable inclined shoot to deliver into a vessel's hold in any position.

The engine-house stands midway between the sites of the two blocks of buildings, and the power is transmitted by wire ropes. The elevators and general machinery take (in the one building) 270 H. P., and the cleansing machinery (which is arranged in two groups dealing each with 150 tons per hour) takes 80 H. P. The largest engine is of 500 H. P.; high-pressure cylinder, 25 8 in. diameter; low pressure cylinder, 51.6 in. diameter, and stroke 49.2 in.; number of revolutions, 60 per minute. There is also 50-H. P. engine for the electric lighting, but during the day, when the tunnels only require illumination, the circuit is coupled onto the large engine. The trucks and wagons are moved over the whole of the sidings by hydraulic capstans, at a pressure of 735 lbs. per square inch.

There is also a floating elevator of 35 H. P., mounted on a pontoon 124 ft. 8 in. in length and 27 ft. 10 in. beam, and used for transhipping from one vessel to another, having one vertical telescope elevator and one adjustable shoot.

TECHNICAL.

Manufacturing and Business.

The Toledo Nut Lock Company, of Toledo, O., has been granted a charter, with a capital of $100,000, and will engage in the manufacture of nut locks and other mechanical devices.

Boston Bridge Works, Boston, Mass., has recently completed buildings for the Washburn & Moen Mfg. Co., Worcester, Mass., one 120×256 ft. and one 120×272 ft., two and three stories. The buildings are to be used as wire mills, and the frame work is exceptionally heavy and the sides of glass.

The Pratt & Whitney Company of Hartford, Conn., is about to put up another large factory. The new building is to be of brick, 140 ft. long, 30 ft. wide and five stories high. Hiram Bissell has the contract.

The following companies have been incorporated in Illinois: Self-acting Air Brake & Coupler Co., of Chicago; incorporators, Victor K. Kerner, T. D. Hurley and Lewis A. Roby:—Columbia Railway Supply Co. of Chicago; incorporators, Roswell H. Mason and George M. Trowbridge.

The J. A. Fay & Egan Co., of Cincinnati, O., has just received a large order for machinery to go to Padang, Sumatra, Dutch East India.

The Boyer Speed Recorder Co., of St. Louis, is in receipt of an order for 360 speed recorders for the Russian railroads. The Boyer speed recorder is now used on a number of English railroads.

Iron and Steel.

The blooming mill, engine room and boiler house of the Lackawanna Steel Co.'s North Mill, at Scranton, Pa., were burned May 29. The entire North Works, which were running double time, will be idle for some months, throwing out of employment 1,200 hands.

Electric Train Lighting in Europe.

Since May 1 of last year electric lighting by means of storage batteries has been in use on a number of cars of the Kaiser Ferdinand Northern Railroad of Austria. These are the first cars which have been so fitted up for regular express train service on the Austrian railroads, and the system is to have a prolonged trial.

On the Paris, Lyons & Mediterranean Railroad electric train lighting by storage batteries is also to be introduced, the conclusion being the outcome of three years of experiment. Fifty first-class cars are to be fitted up with the system, and Tommasi storage batteries will be used.

Broken Rails.

A remarkable case of rail fractures was recently brought to the notice of the Verein für Eisenbahnkunde, of Berlin. On a certain section of one of the German lines no less than 81 broken rails were found in a single day during the past winter. The investigation which was ordered brought out the fact that on a very cold day the brakes were set on one of the cars of a coal train and were forgotten by the brakeman. The line has some heavy grades. The sliding of the wheels made large flat spots on the tires. After a time, it would appear, the brakes went off, releasing the wheels, and the latter through the resulting pounding on the rails produced the fractures mentioned. The correctness of this theory would seem to be borne out by the fact that there were always two fractures opposite each other in the two lines of rails.

THE SCRAP HEAP.

Notes.

The Massachusetts Senate has rejected by a vote of 30 to 2 the bill providing for a new passenger station on the north side of Boston.

The proposition to re-establish the Railroad Commission in Florida has been before the legislature a second and a third time, but has again been defeated.

It is announced in Philadelphia that the Philadelphia & Reading will at once reduce forces in all departments where possible, with the expectation of discharging about 500 men. It is also stated, but rather vaguely, that the Pennsylvania will make further reductions of force. The Chicago, Milwaukee & St. Paul is reported to have discharged 125 men in Iowa.

An express train of the Missouri Pacific was stopped and robbed on the night of May 24 a few miles west of St. Louis. The express car was opened with dynamite and about $4,000 taken. The Governor of the State was on the train. On the night of May 25 two men stopped a Mobile & Ohio train near Forest Lawn, Ill., but were scared off before they succeeded in their intended robbery of the express car. Near Coleman, Tex., on the Atchison, Topeka & Santa Fe, on the morning of May 25, a passenger train was stopped and the express car robbed.

There has doubtless been exaggeration in the press dispatches reciting the damages by the high water in Montana. The heaviest sufferer among the railroads was the Great Northern. Owing to the rise in the Kootenai River traffic between Kalispell and Spokane was interrupted. The Belt Mountain branch was badly washed out and nearly all the bridges between Monarch and Neihart were carried away. The Northern Pacific did not suffer on the main line, and the De Smet branch, in the Couer de Alene country, which was at first thought to be seriously damaged, was repaired within three days and traffic resumed.

Foreign Notes.

Aluminum backs for brushes have been brought out by the German firm of Hermann Müller, of Berlin. They are specially intended for brushes used for industrial purposes.

According to *Cosmos*, the great dome of the new observatory at Greenwich, England, will consist of paper in the form of papier mâché. There will be an iron framework to support this shell.

A large proportion of the coal supply for the Russian Navy Department will, for the immediate future, come from French mines, contracts to this end having just been awarded to several French firms. This is said to have been prompted by the outcome of some recent carefully conducted comparative trials of French and English coals.

The highest sheet iron chimney stack in Great Britain, according to *Stahl und Eisen*, is that of the Pearson & Knowles Coal & Iron Company, at Darwen. Its total height measures 275 ft., and its diameter at the bottom is 27 ft. 6 in. It is made up of 308 separate sheets. Seventeen thousand rivets were used in its construction, and the total weight of the iron work is placed at 115 tons. Eleven weeks were consumed in the work of erection.

An innovation on the Kaiser Ferdinand Northern Railroad, of Austria is the provision in a number of the new cars of slips of paper, put up in pads, and having printed on them the number of the particular car in which they are hung. A passenger leaving a car, for refreshment, for example, at a way station, tears off one of these slips and carries it with him as a means of identification of the car from which he has come. The slip saves the trouble of remembering the number of the car, and is designed to avoid confusion in re-embarking.

Speaking, in one of the French journals, of monster cannon Colonel de Bange, the well-known French military authority, takes the stand which seems, of late years, to have become more and more pronounced, that the extraordinarily large guns which have already been turned out are comparatively inefficient engines of destruction. Their enormous weight, difficulty of handling and consequent slowness in firing, great first cost and relatively short life, all combine seriously against them. The great Krupp gun, for example, which has been sent to the Chicago Fair, Colonel de Bange considers simply as an admirable advertisement for the Krupp establishment, but of little use from a military point of view.

The sustaining power of ice of different thicknesses was made the subject of experiment during the past winter by the French Minister of War. It was found that a sheet of ice 4 cm., or about 1.6 in. thick would easily bear the weight of a single soldier marching in ordinary time. Ice, 9 cm., or about 3.6 in. thick, would sustain infantry divisions if somewhat drawn out. Ice, 12 cm., or about 4.8 in. thick, would sustain the weight of eight field guns, when 14 cm., or about 5.6 in. thick, it would bear a 12-pounder; when 16 cm., or about 6.4 in. thick, it would permit the passage of field pieces, drawn by horses, and equipped with the usual supply of ammunition; and when 29 cm., or nearly 12 in. thick, it was found to sustain the heaviest loads tried.

The St. Paul Railroad Celebration.

The preparations for the Hill celebration at St. Paul are rapidly approaching completion. The arches and reviewing stands are erected, and the staff, similar to the exterior of the World's Fair buildings, is now being applied. Already there have been accepted by the committee the designs for 150 floats for the parade and, as the time approaches, other points are becoming aroused, and it is probable that this number will be greatly increased. The railroads have made a one fare round trip rate for the occasion, and this insures a great attendance.

It Followed the Rock Island Road.

The Rock Island officials at Topeka say they possess a jewel in the person of C. B. Jewell, train dispatcher at Goodland. Mr. Jewell in some way became possessed of the secret of Melbourne, the rainmaker, and has been experimenting with considerable success in the northwestern portion of Kansas. Assistant General Manager Allen believes there is something in the rainmaking business, and has kept Jewell at work on the line of the road from Phillipsburg west. As a result it is claimed that crop prospects are better along the road in that locality than elsewhere in the state. Last week Allen sent Jewell to Mankato with his apparatus, and he had not been at work over 24 hours before the storm of Saturday night appeared. The singular part of the story is that the rainfall followed the line of the Rock Island road; the Union Pacific at the south and the B. & M. north, were left out of the rain belt.—*St. Louis Republic.*

Spanish American Notes.

It is reported from Panama that the Girardot Railroad, Colombia, which was to have been pushed this summer under concessions to J. C. Gibney, of Indianapolis, and others, will stand untouched for an indefinite time. Facilities for transportation have, however, so far improved within the last year or two that the journey from Barranquilla to Bogota, which formerly occupied 45 days and cost $200, can now be made in 15 days for $57.

M. Desgranges has sent 2,000,000 francs to be deposited in the banks of Guayaquil, Ecuador, as a guarantee for the fulfillment of the proposed contract between French capitalists and the Ecuadorian Government for the construction of the Southern Railroad of that Republic. M. René Trottier, the representative of the French syndicate, has asked President Cordero to call an extra session of Congress to consider the proposition which he has drawn up. On the other hand Mr. Alfred H. Haggard, brother of the British Minister to Ecuador has submitted a proposition to the government, in the interests of English capitalists, for the construction of a railroad beginning at Pailon in the Gulf of Ancon, and running through the towns of Ibarra, Quito and Ambato, to Riobamba, the final objective point of the Southern Railroad. No interest guarantees, or other subventions, are asked for by this new company, save that it requests a grant of 20,000 square miles of public lands, to be located by its own agents, with an absolute grant of all mining properties that may be found upon such lands. Pailon is the most northerly anchorage in Ecuador, and is said to be a well protected port. The pass over the mountains between Pailon and Ibarra is the lowest and most feasible in the Ecuadorian Andes.

The cost of sleepers for wide guage track in Brazil averages 92 cents a sleeper. Contracts for 360,000 sleepers were recently awarded by the Central Railroad of Brazil at that price.

This Beats Maine and South Carolina.

The promoters of the Nelson & Fort Sheppard Railroad of British Columbia represented to the Canadian Minister of Railways recently that the sale of liquor along the line would demoralize the laborers and delay the work of construction. An order-in-council was consequently passed prohibiting the sale of liquor within five miles of the road. This road is to run from Columbia River at the international boundary to the Kootenai lakes, near the town of Nelson, B. C.

Minnesota's Elevator.

At the last session of the Minnesota Legislature a bill was passed providing for the erection of a state grain elevator on deep water at or near Duluth. Owing to some technical errors it was at first thought the elevator would not be built. The Board of Railroad and Warehouse Commissioners, who are authorized to select the site and to construct and operate the elevator, are determined, however, to carry out the intent of the law. They have received propositions for 15 sites—the prices varying from $5,000 to $72,000. It is probable that one on upper St. Louis Bay, costing between $15,000 and $20,000, will be selected and, as soon as the title is perfected, work will be begun preparing the site for the erection of the elevator. What action, if any, will be taken by the large elevator companies to prevent the erection of this elevator is not known.

LOCOMOTIVE BUILDING.

Thirty-two of the 100 locomotives which were ordered by the Baltimore & Ohio Railroad from the Baldwin Locomotive Works about the first of this year have been delivered to the company and two locomotives will be received every day until the entire 100 are delivered.

CAR BUILDING.

The shops of the Northern Pacific, at Edison, near Tacoma, Wash., are now working on orders for 100 logging cars and 58 coal cars. About 350 men are now employed. About half of the logging cars have been completed. They are a new pattern, with a capacity of 60,000 lbs., and are 41 ft. long. They have a truck designed by J. S. Barbour, Master Car Builder of the Northern Pacific.

BRIDGE BUILDING.

Avalon, Md.—A toll bridge will be built across the Patapsco River between Avalon and the Thomas viaduct by the Elk Ridge Bridge Co., which has been organized by Charles Marshall, Richard Cromwell and others. The bridge is to cost $65,000.

Bridgeport, Conn.—A petition has been presented to the Common Council asking for a new bridge at Lindley street.

Brunswick, Md.—The substructure of the new bridge over the Potomac river at Brunswick, Md., has been completed and the Youngstown Bridge Company will commence the erection of the superstructure next week. The iron is being delivered on the ground.

Cambridge, Mass.—Proposals will be received at the office of the Cambridge water board until June 5 for the construction of the granite piers and abutments for the Fresh Pond avenue bridge in Cambridge, containing approximately 172 cu. yds. of rubble masonry and 20 cu. yds. of dimension stone, and 25 cu. yds. of concrete. Plans can be seen at the office of the City Engineer, L. M. Hastings.

Cleveland, O.—Proposals are wanted until June 28 for furnishing the material for the construction of the substructure of the Brooklyn bridge across the Big Creek Valley in Brooklyn Township. Address A. E. Akins, County Auditor.

Coeymans Junction, N. Y.—The large bridge crossing Coeymans Creek, about one mile above the station on the Albany branch of the West Shore is to be taken down and an iron and steel structure to be erected in its stead. Work has already been commenced on the abutments.

Danbury, Conn.—The Selectmen have contracted with the Berlin Iron Bridge Co. for two new iron bridges. One is to be built across Washing River on Triangle street and the other across North Meadow Brook on the Hayestown road.

Hainesport, N. J.—The Pennsylvania Railroad Co. has just completed a new drawbridge at Hainesport. The new structure is somewhat larger than the old one.

Harpers Ferry, W. Va.—Jones & Thorne, the contractors for the new Baltimore & Ohio Railroad bridge over the Potomac river at this point and for the tunnel under Maryland Heights, for the same company, are making rapid progress. The tunnel is cut through except 250 ft., and the bridge is so well under way that it will be ready for traffic when the tunnel is completed.

Hummelstown, Pa.—A new iron bridge will shortly span Swatara Creek at the Stoverdale camp grounds.

Jacksonville, Fla.—Receiver Durkee, of the Jacksonville, Tampa & Key West, has been authorized by the courts to build a bridge over McGirt's Creek at a cost of $12,000, and one over Black Creek at a cost of $20,000.

Louisville, Ky.—The United States Engineer will receive proposals for constructing and erecting a new drawbridge at the locks of the Louisville & Portland Canal, and for removing the present bridge, until June 21, 1893. Specifications and information will be furnished on application to G. J. Lydecker, Lieutenant-Colonel Corps of Engineers, U. S. A.

McKeesport, Pa.—Work has been commenced upon the Elizabeth bridge which is to span the Monongahela River. It is said that Eastern capitalists have secured a majority of the stock in the concern.

Meadville, Pa.—Bridges will shortly be erected over French Creek at Mercer street (225 ft.); Broadford (233 ft.), and Venango (249 ft.), to replace those destroyed by the late heavy rainfall, which also destroyed bridges at Conneautville, South Shenango, Conneaut Lake and several other points in this section.

St. Albans, W. Va.—The Chesapeake & Ohio Railroad Company has begun the erection of a new steel bridge at St. Albans, W. Va., in place of the one now in use. It will be put up so as not to interfere with traffic over the old one.

Toronto.—Tenders will be received up to June 5, for the erection of stone abutments and a steel or iron bridge, and for the purchase and removal of the old wooden bridge over the Etobicoke River, on the Lake Shore road, between the counties of York and Peel. Plans and specifications may be seen at the office of J. McDougall, C. E., County Engineer, Court House, Toronto Tenders must be addressed to Geo. Eakin Clarke, County of York, Court House, Toronto.

Waterport, N. Y.—Grattan & Jennings, of Buffalo, have been awarded the contract for the extension of the piers and abutments for the high bridge of the Rome, Watertown & Ogdensburg at Waterport. The contract calls for the extension of 10 piers and two abutments for widening to a double track.

Welch, W. Va.—The Welch Land & Improvement Co., of Welch, McDowell County, W. Va., will erect a highway bridge over Elkhorn River to connect the town with Ridgeway.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Old Colony, quarterly, $2.33⅓ per cent., payable June 30.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Canada Southern, annual, St. Thomas, Ont., June 7.
Chesapeake & Ohio Southwestern, special, Memphis, Tenn., June 13, to approve of the purchase of the Hodgensville & Elizabethtown.
Chicago & Eastern Illinois, annual, Chicago, June 7.
Chicago, St. Paul, Minneapolis & Omaha, annual, Hudson, Wis., June 3.
Duluth Short Line, annual, St. Paul, Minn., June 5.
Keokuk & Des Moines, annual, Des Moines, Ia., June 7.
Leamington & St. Clair, annual, St. Thomas, Ont., June 7.
Mexican Northern, annual, New York City, June 6.
Michigan Midland & Canada, annual, Detroit, Mich., June 8.
Minneapolis, St. Paul & Sault Ste. Marie, annual, Minneapolis, Minn., June 6.
Mobile & Girard, special, Girard, Ala., June 7.
Oregon Railway & Navigation Co., annual, Portland, Ore., June 19.
Parry Sound Colonization, annual, Parry Sound, Ont., June 7.
Peoria, Decatur & Evansville, special, Peoria, Ill., June 30.
Pontiac Pacific Junction, special, 162 St. James street, Montreal, Que., June 17.
St. Joseph & Grand Island, annual, Elwood, Kan., June 13.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 5.
Sarnia, Chatham & Erie, annual, St. Thomas, Ont., June 7.
Toledo, Canada Southern & Detroit, annual, Detroit, Mich., June 8.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *International Association of Car Accountants* will hold its next annual convention at Indianapolis, June 19.

The *Master Car Builders' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 13. Applications for rooms should be made to J. B. Brady, Kent House, Lakewood, N. Y.

The *Master Mechanics' Association* will hold its annual convention at the Kent House, Lakewood, N. Y., commencing June 19.

The *Train Dispatchers' Association of America* will hold its annual convention in Salt Lake City, Utah, June 20.

The *World's Railway Commerce Congress* in connection with the World's Fair at Chicago will hold a meeting at Chicago, June 19.

The *Association of Railway Telegraph Superintendents* will hold a meeting at Milwaukee, Wis., June 20.

The *Western Railway Club* meets in room 730, The Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m. The May meeting has been postponed to June.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p.m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The Association of Engineers of Virginia holds informal meetings the third Wednesday of each month, from September to May inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of June, at 2:30 p. m.

Boston Society of Civil Engineers.

The regular monthly meeting was held at the society's rooms, Boston, on Wednesday evening, May 17, 1893, John R. Freeman in the chair and about 75 members and visitors present.

William M. Brown, Jr., Levi R. Greene, Herman Gregg, William P. Morse and James H. Stubbs were elected members of the society.

The President announced the death of Augustus W. Locke, a member of the society, which occurred at North Adams, May 13, and a committee was appointed to prepare a memoir.

Mr. Dexter Brackett gave a short account of the freezing of the main supplying water to Long Island in Boston Harbor. About 1,200 ft. of 6-in. pipe, laid with the Ward flexible joint across a channel between Moon and Long islands, was frozen during the past winter. The pipe where frozen was constantly covered with from 15 to 25 ft. of water, and the freezing was due to the fact that the salt water of the harbor by which the 6-in. pipe was surrounded, was cooled by the severe cold to the temperature of 28 deg. Fahr. Many of the pipes instead of being burst by the freezing water were separated at the joints, that is, the spigot ends of the pipes were drawn entirely out of the bells into which they had been leaded.

Mr. George A. Kimball opened the discussion of the evening on the Measurement and Value of Water Power. He was followed by Messrs. Chas. T. Main, L. M. Hastings, W. E. Buck and R. A. Hale. As several other members were prepared to take part in the discussion, it was voted to continue it at the meeting on June 21.

Claim Agents.

The annual meeting of the Association of Railway Claim Agents will be held at the Rookery Building, Chicago, on July 11, at 10 a. m. Mr. L. L. Gilbert, of Pittsburgh, Pa., is President of this association, and the Secretary is Edmond P. Clossey, of Cleveland, O.

Engineers' Club of St. Louis.

The Club met at the club rooms May 17, President Moore in the chair, and twenty members and two visitors present.

A letter from Mr. Corthell was read giving a description of the route laid out for the French engineers on their visit to this country.

Mr. E. A. Hermann then read the paper of the evening on

"HIGH SPEEDS ON RAILROADS."

The ideal of high speed has risen from an average speed of 12 miles per hour on the primitive railroad to 50 miles on the best railroads of to-day, and now still higher speeds of 80 to 100 miles per hour are demanded. This could readily be accomplished if it were a question of motive power only. Either the steam locomotive or the electric motor could draw light trains at that speed. The comparative perfection of the motive power, however, is not equaled by that of the roadways and the facilities for preventing delays by interferences from freight and other slower trains. A railroad on which it would be safe to run trains at such high speeds would require four tracks to separate the fast trains from the slow ones; the cost of such a road would be so much greater than the cost of any existing road that its construction in the near future is very doubtful.

It is more practicable to aim at a sufficient improvement of the existing railroads to permit the attainment of long-sustained, moderately high average speeds. High speeds of 70 to 80 miles per hour are attained in regular daily service, but these speeds extend over short distances only on account of heavy grades, delays from other trains, etc. Where the railroads are improved sufficiently to permit a more uniform moderately high average speed, such as could then be easily maintained, the running time between terminal stations will be greatly reduced. All the first-class railroads are being gradually improved, and with these improvements will come higher speeds; they will be developed gradually in the future as they have been in the past, as the gradual improvement of the roadway makes such high speeds safe and profitable.

Discussion followed by Messrs. Ferguson, Wheeler, Seddon, Johnson, Kinealy, Moore, Bryan, Russell, Flad, Crow, Bouton.

For the next meeting a paper by Professor Howe on the Hinged Suspension Bridge was announced.

Western Railway Club.

Owing to delay in completing the coupler tests, it is found necessary to again postpone the May meeting of the club. This meeting will be held in Room 842, the Monadnock Building, on June 6, at 2 p. m. The subjects for consideration are, "M. C. B. Coupler Tests" and "Grab Handles on Freight Cars." These are important subjects, and as this is the last meeting until September, a large attendance is therefore desired.

PERSONAL.

—Mr. Frederick W. Fratt was last week elected Manager of the Sherman, Shreveport & Southern Railroad in Texas, and will be in charge of the construction of the proposed Shreveport extension. Mr. Fratt was formerly Chief Engineer of the Wisconsin Central, and last summer became Chief Engineer of Construction of the Missouri, Kansas & Texas, and was in charge of the extension into Houston, Tex.

—Mr. J. C. McMullen, Vice-President of the Chicago & Alton Railroad, who has been ill at a New York hotel for three weeks, was removed last week to a special car for Chicago. Mr. McMullen had a stroke of paralysis and for many days lay in an unconscious condition. Hope of his recovery was given up. Within a week, however, he has been improving and his family now believe that he will regain his health.

—Prof. Moses G. Farmer died at Chicago May 25, at the age of 73. Professor Farmer, a lifelong resident of New England, and well known to all old telegraphers, was one of the earliest and most ingenious of the American investigators in electrical matters, and his discoveries were numerous and important. His best known inventions are the Farmer fire alarm telegraph system and his automatic repeater for telegraph lines. His inventions in multiplex telegraphy were important and valuable.

—Mr. James Neilson, President of the Youngstown Bridge Co. and Vice-President of the Andrews Brothers Company furnaces and rolling mills, died at Youngstown, O., May 25. Mr. Neilson was well known in the iron trade throughout the Northwest, having come to this country from Scotland 27 years ago. He began as a clerk in the coal and iron industries. By tireless industry and great business ability he won for himself a place in the front ranks. Those who met him will remember him as a quiet man, but commanding respect and admiration.

—Last Friday night the Board of Trustees of Cooper Union conferred upon Mr. J. F. O'Rourke the degree of Civil Engineer, and upon Mr. Allen Sterling that of Mining Engineer. This is the first time that these degrees have been given by the Cooper Union, and it will perhaps never again be done without examination. Both of these gentlemen held degrees of Bachelor of Science from Cooper Union, and the other degrees were conferred upon them without examination in consideration of their actual achievements and positions as engineers. It is the purpose of the Trustees to give hereafter the degree of Civil Engineer and that of Mechanical Engineer to graduates who may have attained such professional position as to deserve it; but it will only be done upon examination.

ELECTIONS AND APPOINTMENTS.

Alliance & Northern.—The stockholders' annual meeting was held at Alliance, O., last week, at which Judge W. B. Sanders, Harvey H. Brown and Dexter B. Chambers, of Cleveland; Morton S. Paton and Theodore Hicks, of New York; F. H. Smith, of Newark, N. J., and Edward B. Scranton, of Alliance, were chosen directors for the ensuing year. Mr. Paton was re-elected President.

Boston, Concord & Montreal.—At the annual meeting of the stockholders at Plymouth, N. H., on May 28, 17,150 ballots were cast for the following directors: Samuel S. Kimball, Noah S. Clark, Charles E. Morrison, Lewis C. Patee, Charles A. Busiel, Hiram N. Turner, Nathan P. Hunt, Frederick P. Weeks, and George H. Bowles. S. G. Kimball was elected President and N. P. Hunt Clerk.

Burlington, Cedar Rapids & Northern.—The annual meeting of the stockholders of the company was held May 23 in Cedar Rapids, Ia. The following directors were chosen: R. R. Cable, A. Kimball, C. P. Squires, Lyman Cook and F. H. Griggs. The directors elected the following officers: R. R. Cable, President of the Board of Directors; C. J. Ives, President; Robert Williams, Vice-President; H. H. Hollister, Treasurer, New York City.

Chicago & Alton.—F. H. Pain has been appointed Division Master Mechanic of the St. Louis & Kansas City divisions, with headquarters at Slater, Mo.

Cleveland, Akron & Columbus.—W. C. Rinearson, formerly General Passenger Agent of the New York, Lake Erie & Western road, and now General Travelling Passenger Agent of the Chicago & Great Western, has been appointed General Passenger Agent of the Cleveland, Akron & Columbus. W. K. Richards is General Freight Agent.

Fort Worth & Rio Grande.—C. H. Burk, having resigned, H. D. Galbraith has been appointed Master Mechanic, with office at Fort Worth, Tex.

Galveston, Harrisburg & San Antonio.—L. J. Parks, Chief Clerk in the office of the General Superintendent of the Southern Pacific, at Houston, Tex., for the last three years, has been appointed Assistant General Passenger Agent of this road and of the Texas & New Orleans. His office will be at Houston, Tex.

Grand Trunk.—P. F. Hodgson has been appointed Signal Engineer, with headquarters at Bonaventure Station, Montreal. Mr. Hodgson was formerly with Messrs. Saxby & Farmer, of London, Eng.

Great Northwest Central.—Horatio F. Forrest, Chief Engineer of this road in Canada, has been appointed by the court here Receiver and Manager of the road, and has assumed control of the same.

Hearne & Brazos Valley.—At a meeting of the stockholders held in Hearne, Tex., the following officers were elected: T. C. Westbrooke, President; R. J. White, Vice-President; Edwin Wilson, General Superintendent, and H. B. Easterwood, Secretary and Treasurer.

Indianapolis, Decatur & Western.—George H. Graves has been appointed Superintendent of this road, in place of L. A. Boyd, resigned to take service with the Citizens' Street Railroad, of Indianapolis.

Louisville Southern.—Charles W. Ferris has been made Division Freight Agent of the Louisville Southern, vice Horace F. Smith, made General Freight Agent of the Queen & Crescent.

Missouri, Kansas & Texas.—The annual meeting was held at Parsons, Kan., May 17. The following is a corrected list of the directors elected: John D. Rockefeller, William Rockefeller, Henry C. Rouse, Colgate Hoyt, Henry W. Poor, William Bond, William Dowd, Joel F. Freeman, Simon Sterne and Joseph H. Bond, all of New York; Thomas C. Purdy, St. Louis; F. N. Finney, Milwaukee, Wis.; B. P. McDonald, Ft. Scott, Kan.; Alfred J. Poor, Chapman, Kan.; Lee Clark, Parsons, Kan., and H. J. de Marez Oyens, Amsterdam, Holland. The following officers were elected: Henry C. Rouse, President and Chairman of the Board; Thomas C. Purdy, Vice-President and General Manager; William Dowd, Vice-President, and Charles G. Hedge, Controller, Secretary and Treasurer. Reports formerly made to the first vice-president and to the second vice-president will now be made to the vice-president and general manager. Officials of the financial and accounting departments will report to the Controller.

John W. Allen, General Freight Agent, with headquarters at Sedalia, Mo., has been appointed General Freight Agent for the Texas lines of the same system, vice John A. Smith. The Missouri Division will be included in the jurisdiction of General Freight Agent Haile, whose headquarters are at St. Louis. Denison is the dividing point of the two divisions.

Mobile & Ohio.—The stockholders at a special meeting at Mobile, Ala., May 29 elected the following directors: James C. Clark, C. Sidney Shepard, Adrian Iselin, Jr., H. B. Plant, A. S. Stevens, Thomas E. Jevons, James H. Fay, C. C. Cuyler, F. D. Tappen, E. L. Russell, James H. Mason, E. S. Knapp, W. Butler Duncan.

Montauk Extension.—The directors of this new company, which is to build an extension of the Long Island road, are as follows: Austin Corbin, Charles M. Pratt, William J. Kelly, Brooklyn; D. S. Voorhees, Woodbridge, N. J.; A. N. Helm and W. J. Helm, Hollis, N. J.; F. Cook, Orange, N. J.; Thomas H. Ryan, Morris Park; J. A. Davis, Frank M. Kelly and Everett R. Reynolds, New York.

Northern N. H.—The annual meeting was held at Concord, N. H., May 25th. The following were re-elected directors: Alvah W. Sulloway, Franklin, N. H.; Josiah H. Benton, Jr., Silas Peirce, Benjamin P. Cheney and Urial H. Crocker, Boston; Dexter Richards, Newport, and William F. Thayer, Concord, N. H.

North Pacific Coast.—A new Board of Directors has been elected by the stockholders, the following constituting the new board: Alfred Borel, J. R. Stetson, Christian de Guigne and J. C. Coleman.

Philadelphia & Reading.—Several changes in the operating department are announced: General Manager I. A. Sweigard becomes General Superintendent of the main line division in place of M. Lawlor, who becomes Manager of the Atlantic City Railroad in place of R. S. Davis, retired. No successor to the General Manager has been appointed as First Vice-President Voorhees will also act in that capacity. The resignation of Francis I. Gowen, Chief Assistant General Solicitor of the railroad, is also announced.

Port Townsend Southern.—At the annual meeting of the stockholders held at Port Townsend, Wash., May 18 the following were elected: President, C. W. Starbuck, of New York; Vice-President, C. J. Smith, of Seattle;—Directors, F. H. Prince, of Boston; Andrew Burleigh and Thomas F. Bush, of Seattle, and Thomas Jackman and Charles Eisenbeis, of Port Townsend.

St. Louis, Chicago & St. Paul.—H. L. Harford has been appointed Cashier and Paymaster, with office at St. Louis; appointment in effect at once.

Santa Fe, Prescott & Phœnix.—F. A. Healy has been appointed General Freight and Passenger Agent, with headquarters at Prescott, Ariz. The railroad has only recently been completed to that point.

Sherman, Shreveport & Southern.—The stockholders of the company held their first annual meeting at Greenville, Tex., May 20, and elected the following directors: Henry W. Poor, New York; W. M. Giles, Mineola, Tex.; T. Randolph, Sherman; W. B. Munson, Denison; Thomas H. King, W. A. Williams, Greenville; William T. Atkins, Jefferson. The directors elected the following officers: W. B. Munson, President; Thomas H. King, Vice-President; F. W. Fratt, General Manager; H. N. Marache, Seretary and Treasurer; E. M. Alvord, General Superintendent.

Texas Midland.—The meeting of the directors in Terrell, Tex., May 23, resulted in the following organization: E. H. R. Greene, Terrell, President; J. B. Harris, Terrell, Treasurer; W. J. Quinlan, Jr., New York, Assistant Treasurer; J. R. Sandifer, Terrell, Secretary.

Unadilla Valley.—At the recent annual election the following directors and officers were elected: President, Ralph Brandreth; Vice-President, William Forster; Treasurer, Benjamin W. Appleton; Secretary, Clarence Goadby; General Manager, Frederic F. Culver; and Frederick de Coppet and William L. Skidmore.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Ashland Terminal.—This company has been organized at Ashland, Wis., for the purpose of building a belt line around the city. Engineers are now at work locating the line, and as soon as the right of way is secured construction will be begun. The line is to be completed this year.

Boston & Maine.—The company which has recently purchased the branch known as the West Amesbury road, formerly leased, is contemplating extending the tracks from Merrimack west to Amesbury, Mass. This would give a direct line by way of Haverhill to Boston. It is reported that a survey has been made and an estimate of the cost obtained. The proposed extension is between three and four miles long.

Buffalo & Geneva.—The last construction work of the Lehigh Valley extension to Buffalo was completed last month and the road is now ready to be turned over to the operating department, and the transfer from the construction department was expected to take place on June 1. Chief Engineer Paul S. King is to remain as the engineer in charge of the division.

Burrard Inlet & Fraser Valley.—J. Q. Barlow, Chief Engineer, reports that the surveys from Sumas City, Wash., to Port Kells, are finished, and the agents of the company are now negotiating for the right of way. It is proposed, he says, to use the Great Northern track from Port Kells to South Westminster, B. C., 10 miles; a joint agreement between the Northern Pacific and Great Northern respecting this portion of the Fairhaven Southern branch and the use of the Fraser River bridge being one of the objects of Colonel Dickinson's trip to New York.

Calgary & Knee Hills.—Surveys are being made for this road northwest of Calgary, Alberta, and it is thought that actual work will be begun this season. The promoters are members of an English syndicate which owns coal mines in the Knee Hills, which it is proposed to operate on an extensive scale. The mines are situated about 60 miles northeast of Calgary in Alberta and there are no engineering difficulties to prevent the building of the railroad.

Carrabelle, Tallahassee & Gulf.—Work on the railroad will be commenced at Tallahassee, Fla., and pushed rapidly through to the terminus of the 20 miles already constructed on the Carrabelle end, which have been operated for several months. The distance from Tallahassee north to the terminus at the Sopchoppy River is about 30 miles. General Manager Symington is in charge of the work.

Centralia & Chester.—The extension of this line to Centralia, Ill., was opened for traffic last week, and regular trains are now running into that town, connecting with the Illinois Central, the Jacksonville Southeastern and the Louisville, Evansville & St. Louis. The road now in operation extends from Sparta northeast through Nashville to Centralia, 47 miles.

Chicago, Rock Island & Pacific.—Engineers are locating an extension of the Des Moines & Fort Dodge 32 miles in length, from Ruthven, Ia., north to Jackson, Minn. The townships through which the proposed line is being located will be asked to vote aid, and, if they do so, the line will be built this summer.

Colorado Midland.—The Cripple Creek branch will be pushed to a rapid completion. The officers estimate that the narrow gauge track will be completed to Midland City, Col., within thirty days, and to Cripple Creek by September. Contracts for grading the unfinished portion will be let within a few days.

Dry Fork.—John W. Moore, with a corps of assistants, has surveyed the final route of this road from Bretz, on the West Virginia Central & Pittsburgh, along Cheat River to the mouth of Dry Fork and along Dry Fork to the Greenbrier Divide, something over 20 miles. The company will condemn the land for the right of way through Tucker County, W. Va., so far as the survey has been made. R. F. Whitmer, of Philadelphia, is President. The road will develop a tract of 70,000 acres of fine timber and coal, which is owned by members of the company.

Duluth, Missabe & Northern.—St. Louis County on Friday last voted to issue $250,000 in bonds to be exchanged at par for the stock of the railroad company. The proceeds from the sale of the bonds will be used in extending the main line of the road and in building branches to the iron mines in northern Minnesota.

Florence & Cripple Creek.—The final location and cross section between Florence and Cripple Creek, Colo., are now nearly completed, the work being in charge of the Chief Engineer, H. A. Sumner. The road will be 40 miles long, crossing the Arkansas River near Florence, and extending southwest to the Cripple Creek mines. The road will be narrow gauge with maximum grades of 3½ per cent., and curvature of 24 deg. W. E Johnson, of Florence, is President and General Manager

Hampden & Winterport.—This company, for which a charter was procured from the last Maine Legislature, was organized in Bangor this week. The company proposes to build the line from Hampden south through Frankfort, Winterport and Prospect to Stockton Springs, about 25 miles along the west bank of the Penobscot River, beginning work at once.

Hearne & Brazos Valley.—The company has secured an amendment to its charter authorizing an extension from its present terminus in the Brazos Valley to the town of Independence, in Washington County, Tex. This is about 20 miles south of the present terminus at Stone City, the route being through the Brazos Valley.

Kingfield & Dead River.—A. F. Hilton, a civil engineer with the Maine Central, and a party of surveyors, are locating this line from Kingfield, Me., north toward Dead River, having completed about six miles of the survey. The line is to be narrow gauge and will probably be built this summer.

Middlesex Valley.—Two extensions of this line in Central New York have been surveyed and will probably be built during the summer. The road has been in operation since September, 1892, from Stanley to Naples, N. Y., 22 miles. The surveys have been made for an extension southerly from Naples to a connection with the New York, Lake Erie & Western, and the Delaware, Lackawanna & Western at Wayland and Perkinsville, N. Y.; also for an extension from Stanley northeast to Geneva. Work will be begun first on the Geneva line.

Minneapolis, St. Paul & Sault Ste. Marie.—The tracklaying on the Northwestern extension was begun at Cathay, N. D., last week. The grading is now so far advanced that it is expected that the tracklaying will go on without interruption until the line reaches the International Boundary where the connection with the Canadian Pacific is to be made. It is proposed to lay three miles of track daily and to complete the work by Aug. 1.

Montauk Extension.—Austin Corbin and his associates in the Long Island Railroad Company have formed the above company for the purpose of building a standard gauge road from Bridgehampton easterly to Fort Pond Bay, and along the bay to Cullodin Point, in Suffolk County, Long Island. The road will be about 25 miles long and the capital stock is fixed at $500,000.

Monterey & Fresno.—The contract for building this road has been let to a company called the California Construction Co., and a force of men has recently begun construction work on the line near Monterey, Cal. The road is to be built from the Pacific Coast at that point to Fresno, about 160 miles. The engineers have completed the surveys through San Benito County and across the mountains.

Nelson & Fort Sheppard.—Peter Larson & Co., who have the contract for building this extension of the Spokane & Northern, now have nearly 3,000 men at work clearing the right of way, and on the grading in British Columbia. The road is being built from the International Boundary Line north to Nelson, B. C., about 40 miles, and it is to be completed by Oct. 1 next.

New Roads.—The Iron Gate Furnace Co., of Newcastle, Va., intends building a three-mile narrow gauge road to connect its mines with the Craig Valley road.

New York & New England.—The eight-mile extension of the Woonsocket & Pascoag road, from Pascoag, R. I., to East Thompson, Conn., is now practically completed, and the first engine was run over the rails last week. The branch is six miles long, and connects with the New York & New England at East Thompson.

Palisades.—The actual work of building the railroad, which is to extend from the south line of Bergen County to Alpine, opposite Yonkers, along the top of the Palisades, was started last week, and 300 men are now at work. A double track will be laid from the county line near Weehawken, N. J., to Fort Lee, and a single track from Fort Lee to Englewood, north of which point the right of way has not been established. The double track is to be completed by November. A peculiar feature of the ground at one point on the Palisades, where the engineers supposed there was a practically solid rock bed, was the discovery that they would have to drive piles to a depth of 35 ft., the spot being a sort of sink-hole. The railroad is to be connected with and be operated under a guaranty by the North Hudson County Railroad.

Pennsylvania.—The Shenandoah-Girardville branch of railroad, extending from a point half a mile south of Shenandoah station, Pa., to the New William Penn colliery, a distance of about two miles, has been completed and will be opened in a few days. The road will be used exclusively for the transportation of coal from the new breaker, which is ready to go into operation, and whose capacity will be about 1,000 tons daily.

Rochester & Willman.—This company has been formed in Minnesota by Donald Grant, K. D. Chase and others. It is the intention to build a line of road between Rochester and Willman, passing through Faribault, Northfield, Henderson, Owatonna and other towns. The city of Faribault has subscribed $10,000, and other cities and towns will also be asked to subscribe aid. The work generally will not be heavy, and the projectors say they will begin grading very shortly. The distance will be 168 miles.

St. Louis, Chicago & St. Paul.—The tracklaying on the extension to connect with the Merchants' Bridge Terminal system was commenced near Alton, Ill., last week. This extension is to be about 20 miles long from Alton, south along the Mississippi River levees connecting with the railroad of the St. Louis Merchants' Bridge Terminal Company on the east side of the river at a town called Kinder. The work will now be pushed vigorously and trains will be run early in the fall.

St. Paul, Minneapolis & Lake Superior.—The organization of this company by Donald Grant and K. D. Chase, of Faribault, Minn., was noted last week. A company called the Minneapolis, St. Paul & Lake Superior

has also been organized by the incorporators. The route of the road is from the cities of Minneapolis and St. Paul in a northeasterly direction to White Bear Lake, thence in an air line to Amidor on the St. Croix River, thence following Wolf Creek six miles to a point on the St. Croix River where the Yellow River empties into the former stream, thence following the Tamarack River northeast to its source, and from that point directly north to Superior. Preliminary surveys have been completed, and the location surveys are now in progress, and the building of the line will probably be undertaken during the coming summer. The contracts for the grading and tracklaying are already let to a construction company, but no work has been started. The work will be comparatively easy except at the crossings of the St. Croix River, where some heavy rock work will be encountered. The maximum grade 26½ ft. to the mile, maximum curvature three degrees. Four steel bridges, aggregating 1,200 ft. in length, will be built. Donald Grant is President, and F. H. Anson, Oneida Block, Minneapolis, Secretary.

San Diego, Yuma & Phœnix.—Chief Engineer Knox has completed the survey of the line from Phœnix to Yuma, Ariz. Highest grade, 80 ft. to the mile for 10 miles. The distance by the line from Phœnix to Yuma is 174 miles.

Spokane Falls & Northern.—Wren & Greenough, the contractors, have completed the extension of the line from Northport, Wash., to the boundary line. Work on the cantilever bridge over the Pend d'Oreille River is well under way, and the contractors for the extension north of the boundary line are preparing to commence work. Owing to the heavy snow fall during the winter and the freshets, the work has been delayed.

Teche Railroad & Sugar Co.—The survey has been made and right of way secured for a railroad connecting Bayou Teche at the Huron refinery with Carencro, La. The road will reach a rich section of Lafayette and St. Martin parishes. It is said that the building of the road will commence immediately. Dr. S. A. Knapp, of Lake Charles, is President.

Unadilla Valley.—A trip of inspection was made last week by a party of directors and stockholders, which went over the road as far as completed, from Bridgewater south to Leonardsville, N. Y. It is said that the entire road will be completed and in operation within four months. A force of men will be put at work at once ballasting the road from Bridgewater to Leonardsville, and grading from the latter place to New Berlin. About eight miles of grading south of Leonardsville has been completed. It is hoped that the road will be in running order as far as Leonardsville by July 1. The party consisted of Ralph Brandreth, President; Clarence Goadby, Secretary; Frederick F. Culver, General Manager; William L. Skidmore, Robert Dunlap and Edward A. Quintard, of New York City; and M. L. Davis, of Bridgewater, Resident Engineer.

Western Maryland.—The possibility of making a connection with the Baltimore & Ohio to secure an outlet for this line to tidewater is again under consideration. President Hood, of the Western Maryland, in an interview last week, spoke as though he felt encouraged that such a connection could be arranged. The plan he has in contemplation is to extend the Western Maryland from Windsor Station to Blue Bridge, near Mount Winans, where the connection would be made, a distance of about five miles. This is estimated to cost, rights of way and all, about $200,000, which amount he says can be raised without trouble if the arrangements are perfected with the Baltimore & Ohio.

Whitefield & Jefferson.—The directors of the Concord & Montreal Railroad have voted to aid this railroad in extending its line from Berlin Falls to Pontocook Falls, N. H., a distance of 12 miles. Work on the extension will be pushed and completed the present season.

Wilmington & Weldon.—Proposals are invited until June 17 by Colonel F. Gardner, Chief Engineer of the Atlantic Coast Line, for the grading, trestle work and masonry on an extension of the Manchester & Augusta from Remini in Clarendon County, S. C., south of Sumter, to Denmark, in Barnwell County, 44 miles. The work will be divided into sections of about five miles each and bids will include the trestles on the sections, with the exception of those of Santee River, North Edisto, South Edisto and Halfway Swamp. The Santee River trestle will be about 14,000 lin. ft.; North Edisto, about 2,800 lin. ft.; South Edisto, about 5,000 lin. ft., and Halfway Swamp, about 1,000 lin. ft. For the above mentioned trestles separate bids are invited. The extension is to be completed before Jan. 1 next.

Winona & Southwestern.—A special election will be held at Mason City, Ia., on May 31, on the proposition to levy a five-per cent. tax to aid in the construction of this line from Osage to Mason City.

GENERAL RAILROAD NEWS.

Central of Georgia.—The hearing before Justice Jackson at Atlanta, Ga., in the involved litigation regarding the receivership of this road and the plans for re-organizing the company, has been adjourned until June 6 at Savannah. The suits were brought in the interests of the Richmond & West Point Terminal for the removal of Receiver H. M. Comer and the appointment of a new receiver, and also to prevent the Receiver from arranging with H. B. Hollins & Co., of New York, for certain loans and depositing with that firm securities of the railroad.

Chicago, Burlington & Quincy.—The report of the earnings for April is given in the following table:

Month of April:	1893.	1892.	Inc. or dec.
Gross earn	$2,990,399	$2,757,629	I. $232,770
Oper. expen	2,266,033	2,073,966	I. 192,066
1-12th annual charges	839,000	815,075	I. 14,924
Expen. and charges	3,096,033	2,889,041	I. 206,991
Net earn (def.)	$105,633 (def.)	$131,412	D. $25,778
Four months:			
Gross earn	$12,392,487	$12,087,569	I. $304,917
Oper. expen	8,750,569	8,203,199	I. 547,370
4-12ths charges	3,320,000	3,260,300	I. 59,699
Expen. and charges	12,070,569	11,463,500	I. 607,069
Net earn	$321,917	$624,069	D. $302,152

Houston Belt & Magnolia Park.—Judge Breshear, of the Texas District Court, has removed A. J. Baker, Jr., as Receiver of the railroad and appointed in his stead John Kennedy, of Houston. It is said that the new Receiver will open the road for traffic. The company owns six miles of railroad, built in 1890, from Houston to Magnolia Park and to deep water.

Lehigh Valley.—The Philadelphia & Reading, lessee of the railroad, reports the result of the operations for March as follows:

	1893.	1892	Inc. or Dec.
Gross earn	$1,551,629	$1,306,133	I. $245.496
Oper. expenses	957, 498	1,158,310	D. 200,812
Net earn	$594.131	$147,823	I. $446,308
Four months ending March 31:			
	1893.	1892.	Inc. or Dec.
Gross earn	$5,949.799	$5.638,046	I. $311,753
Oper. expenses	4,277.019	4,694,375	D. 417,356
Net earn	$1,672,780	$943,671	I. $729,109

New York, Lake Erie & Western.—The following table gives the earnings for April, 1893 and 1892:

	1893.	1892.	Inc. or dec.
Gross earn	$2,378,065	$2,495,235	D. $117,170
Oper. expenses	1,626,849	1,686,133	D. 59,284
Balance	$751.216	$809,102	D. $57.886
Due leased lines	221,584	219,239	I. 2,345
Net earn	$529,632	$589,863	D. $60,231

Norfolk, Albermarle & Atlantic.—George S. Jones, of New York City, President of the company, was appointed Receiver last week by Judge Brooke, of Norfolk, Va. The Receiver is now in possession of the railroad, which is 18 miles long, and extends from Norfolk west to Virginia Beach, on the Atlantic. The company owns a summer hotel and other seashore property at that point. The railroad has a bonded indebtedness of $500,000. It is a reorganization of the Norfolk & Virginia Beach. The new company was organized in 1892, and proposes to change the road to standard gauge and build several extensions.

Pennsylvania.—The following statement shows the earnings of the lines east of Pittsburgh and Erie for April:

	1893.	1892.	Inc. or dec.
Gross earn	$5,895,492	$5,746.730	I. $148,762
Oper. ex	4,199,381	4,008,508	I. 190,773
Net earn	$1,696,111	$1,732,122	D. $42,011

The four months of 1893 as compared with the same period of 1892 show an increase in gross earnings of $618,296; an increase in expenses of $1,442,302 and a decrease in net earnings of $824,006.

All lines west of Pittsburgh and Erie for April, 1893, as compared with the same month in 1892, show an increase in gross earnings of $181,489; a decrease in expenses of $108,163 and an increase in net earnings of $289,652.

Philadelphia & Reading.—The plan for rehabilitating the railroad was made public on May 28. It provides for the issue of $30,000,000 of six per cent. collateral trust bonds, for which are pledged securities and accounts, the revenue from which is placed at $2,125.636, with $114,520 to be added after the issue of $10,363,000 general mortgage four per cent. bonds in 1898. The collateral trust bonds will be redeemable at any time before their maturity at 110 per cent., and the mortgage will allow the trustee to apply the surplus income or the proceeds of the sales or realization of any of the securities pledged until 1898 and thereafter to the purchase of the bonds. Of the $30,000,000 bonds $22,000,000 is to be issued now at 95 and $8.000,000 to be reserved in the treasury for working capital and improvements, to be put out in issues of $2,000 000 each in the years 1893, 1894, 1885 and 1896. The floating fund, which is placed at $19,991,940, is to be paid off out of the proceeds of the $22,000,000 to be issued now. A voting trust for seven years is provided for, with President Joseph S. Harris, E. P. Wilbur, Thomas McKean and two others to be named as trustees. The consent of 90 per cent. of the general mortgage bondholders is required, and they must also sell their interest or coupons to the trustees, taking bonds in payment. The plan concludes with this statement: "It is necessary that the stockholders and holders of the general mortgage bonds and the bonds of the affiliated companies named in the plan should give their assent to the plan of readjustment and become parties to the several agreements in which they are respectively interested on or before June 31, and unless, in the judgment of the Board, the assent of the requisite number of creditors and stockholders shall have been received by that day, the syndicate subscriptions will be released and the plan abandoned. If the plan goes through, subscriptions to the $30,000,000 funding loan will be received from June 22 to July 1, payable as follows: Ten per cent. on July 1, 25 per cent. on Aug. 15, 30 per cent. on Sept. 15, 30 per cent. on Nov. 1."

Following the plan is an explanatory statement giving reasons why stockholders and bondholders should agree to the plan. After setting forth the necessity for providing for the floating debts, reducing the fixed charges, and putting the Reading on a stable foundation, the statement says: "If these terms are accepted by the creditors and stockholders, the personal property of the company will be saved from sacrifice, the integrity of the system preserved, the creditors will get all that the property earns, and the company will have substantial relief during five years for the development of its business. If they are refused, an issue of receiver's certificates must be made or default occur in interest on the prior mortgages. The control of the lines acquired subsequently to the reorganization may be lost, the securities and personal property sacrificed, and the task of reorganization may be undertaken under the pressure of impending or after actual foreclosure, and in either event the money or the larger part of it now tendered must still be raised by the creditors and shareholders, or the earning power of the property be permanently and seriously crippled."

Philadelphia & Reading.—The statement of the operations of the railroad company for April and the fiscal year is as follows:

Month of April:	1893.	1892.	Inc. or dec.
Gross earn	$1,839,974	$1,701,410	I. $138,564
Oper. expen	1,147,424	1,012,674	I. 134,750
Net earn	$692,550	$688,736	I. $3,784
Other income	64,727	50,756	I. 13,971
Total revenue	$757,277	$739,522	I. $17.755
Permanent improvements		8,760	D. 8,760
Fixed charges	650,000	625,841	I. 24.159
Surplus	$107,277	$104,921	I. $2,356
Five months to April 30:			
Gross earn	$9,004,994	$8,919,544	I. $84,950
Net earn	3,376,619	4,047,686	D. 671,067
Surplus	62,252	837,283	D. 775,031

San Francisco & West Shore.—The company has given a mortgage to the California Title Insurance & Trust Co. for $1,000,000 to secure six per cent. bonds, to run 30 years. This is a projected road in California from San Francisco to San Mateo Bay.

TRAFFIC.

Traffic Notes.

It is reported that the Canadian Pacific will make a general reduction of 10 per cent. in local freight rates throughout Ontario and Quebec.

The Toledo, St. Louis & Kansas City has withdrawn from the St. Louis Eastbound Traffic Association. The road is in financial distress and it is said that this action is taken to reduce expenses and not with any intention of disturbing rates.

The American Express Company now does business over the Fremont, Elkhorn & Missouri Valley, the Sioux City & Pacific, and the Chicago, St. Paul, Minneapolis & Omaha, and it is stated that Wells, Fargo & Co. have no lines at all in either Nebraska, Wyoming or South Dakota.

The Railroad Commissioners of Missouri have notified the railroads that they must not require a man to accompany a single animal when shipped by freight. The substance of the order seems to be that such freight must be accepted the same as ordinary merchandise. A shipper desiring to accompany his stock must, however, be allowed to do so.

A Minneapolis paper states that the Chicago, Milwaukee & St. Paul has taken off all of its "short line" trains heretofore run between Minneapolis and St. Paul, on account of lack of patronage. This business, which was formerly quite large and for which a large number of trains were run daily, has been taken by an electric street railroad.

The Iowa Supreme Court has sustained the Dubuque District Court in the case of the State against the Chicago, Milwaukee & St. Paul. The road refused to switch cars received from Ohio over another road and the Railroad Commissioners instituted mandamus proceedings. The court holds that the business was interstate commerce over which the Iowa Commissioners have no jurisdiction.

It is stated that the advance in freight rates on pig iron from the South, which has been agreed upon by the Pennsylvania and the Baltimore & Ohio, will amount to 35 cents a ton, and that it goes into effect June 1. It is said that this affects chiefly the furnaces in Virginia and West Virginia. The Alabama furnaces have other outlets and the Eastern furnaces on the Chesapeake & Ohio and the Norfolk & Western are also comparatively independent of the Philadelphia roads.

The decision of Messrs. Cassatt and Bliss on the question of excess fares on trains between New York and Chicago is reported by the daily papers as follows: The arbitrators decided that the standard rate, $20, should be charged on trains scheduled at 28 hours or more. The fare on the present limited (25-hour) trains is left unchanged at $23, but on what are known as 26-hour trains they decided that the fare should be $22, an advance of $2 over the present fare on these trains; and on the 20-hour trains it is to be $26.

The Santa Fe has made a round-trip rate of $37.50, Denver to Chicago, and $17.50 from Missouri River points to Chicago and return. Other roads will probably meet these rates.

Chicago Traffic Matters.

CHICAGO, May 31, 1893.

Various efforts were made last week to bring about a settlement of the rate disturbances from Colorado territory to Chicago in connection with World's Fair tickets, but without success. On Monday a conference was held between the representatives of the Burlington, Rock Island and Santa Fe at which the question of the extension of the jurisdiction of the Western Passenger Association to trans-Missouri territory was considered in connection with the other questions of difference, but nothing definite has resulted.

The customary cutting of rates on wool eastbound has begun, the Kanawha Despatch having reduced the standard rates 13 cents per 100 lbs. from the Mississippi River to the seaboard. The reduction has been promptly met by the other lines and probably the usual scramble for the business will ensue.

An agreement has been made between the Chicago & Eastern Illinois, Cincinnati, Hamilton & Dayton, Cleveland, Cincinnati, Chicago & St. Louis, Evansville & Terre Haute, Lousville, New Albany & Chicago and the Pennsylvania for the discontinuance until Nov. 1 of all commission payments on all tickets reading over their respective lines sold after May 31 in all territory south or east of the Ohio River gateways, viz., Louisville, Evansville and Cincinnati, and also in all territory north and west of Chicago.

The newspapers generally are charging the railroads with being the cause of the slim attendance thus far at the Exposition, on the ground that the rates fixed are so high that the people will wait and take their chances of a rate war when the roads find that they are not hauling the number of passengers that they expected. That these charges are in great measure unfounded is evidenced by the comparatively small attendance of our own residents, who are doing what many others are—waiting until they know that the exhibits and buildings are ready.

An important meeting of the managers of the lines in the Central Traffic Association is being held here today. Questions growing out of the recent action of the Trunk Lines in regard to rates for the Exposition, differentials, fast train service, etc., are under consideration for concurrence or rejection by the Western connections.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending May 27, amounted to 51,485 tons, against 52,343 tons during the preceding week, a decrease of 858 tons, and against 53,718 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to May 27.		W'k to May 20.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	7,342	14.3	7,037	13.5
Wabash	2,319	4.5	2,991	5.7
Lake Shore & Michigan South.	10,118	19.7	10,944	20.9
Pitts., Ft. Wayne & Chicago	7,423	14.4	7,256	13.9
Pitts., Cin., Chicago & St. Louis	4,497	8.7	6,419	12.3
Baltimore & Ohio	3,442	6.7	3,339	6.4
Chicago & Grand Trunk	6,078	11.8	4,207	7.9
New York, Chic. & St. Louis	4,261	8.3	3,185	6.1
Chicago & Erie	4,276	8.3	5,836	11.2
C., C., C. & St. Louis	1,729	3.4	1,129	2.1
Totals	51,485	100.0	52,343	100.0

Of the above shipments 2,012 tons were flour, 21,012 tons grain and millstuff, 6,478 tons cured meats, 9,820 tons dressed beef, 1,242 tons butter, 1,789 tons hides and 6,821 tons lumber. The three Vanderbilt lines carried 42.3 per cent., the two Pennsylvania lines 23.1 per cent. The Lake lines carried 65,565 tons, against 63,005 tons during the preceding week, an increase of 2,560 tons.